

DEPARTMENT OF TRANSPORTATION

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**** WARNING ** WARNING ** WARNING ** WARNING ****
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May 7, 2004

11-SD-15-M35.4/M38.7
11-080914
ACIM-015-4(192)21N
CMSTPL-6211(034)

Addendum No. 6

Dear Contractor:

This addendum is being issued to the contract for Building Construction in SAN DIEGO COUNTY IN SAN DIEGO FROM CAMINO DEL NORTE UNDERCROSSING TO 0.5 KM NORTH OF RANCHO BERNARDO ROAD UNDERCROSSING.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on May 20, 2004.

This addendum is being issued to revise the Project Plans, Notice to Contractors and Special Provisions, the Proposal and Contract, and the Federal Minimum Wages with Modification Number 4 dated 3-26-04.

Project Plan Sheets 21, 37, 368, 369, 405 through 407, 416 through 418, 442 through 453, 471, 475, 494 495, 500 through 522, 538 through 540, 626, 629, 634, 635, 637, 666, 678, 679, 682, 687, 707, 708, 709, 711, 712, 732, 733, 734, 736, 737, 759, 760, 761, 763, 764, 783, 784, 786, 787, 788, 790, 791, 805, 806, 807, 809, 811 through 844, 855, 859, 865, 866, 872, 873, 874, and 875 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 29A, 428A through 428H, 441A through 441C, 475A through 475J, 504A through 504Y, 504AA through 504AT, 509A through 509F, 540A, 540B, 541AN, 541AO, 541AP, 541AQ, 541AR, 541AS, 541AT, 541AU, 541AV, 541AW, 592A through 592C, and 840A through 840D are added. Half-sized copies of the added sheets are attached for addition to the project plans.

Project Plan Sheets 423, 424, 496, 508A through 508F, 523 through 533 are deleted.

In the Special Provisions, Section 1, "SPECIFICATIONS AND PLANS," the seventh item of the fourth paragraph is revised to read:

"7. Stage Construction and Traffic Handling Plan (Portion)"

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In the Special Provisions, Section 1, "SPECIFICATIONS AND PLANS," the following item is added after the last item of the fifth paragraph:

"Stage Construction and Traffic Plans (Remaining Portion)"

In the Special Provisions, Section 5-1.16, "PAYMENTS," the following items are added after the last item of the fourth paragraph:

"AA. Soil nail assemblies"
"BB. Tieback Anchors"

In the Special Provisions, Section 5-1.23, "INTERNET DAILY EXTRA WORK REPORT," is added as attached.

In the Special Provisions, SECTION 9, "DESCRIPTION OF BRIDGE WORK," the following list of structures are added after the last structure of the fourth paragraph:

"RETAINING WALL NO. 364L (Bridge No. 57-1183M)
An earth retaining structure, consisting of a mechanically stabilized embankment (MSE) system.

RETAINING WALL NO. 370L (Bridge No. 57-RW370L)
A multi-rowed soil nail retaining wall of variable height as shown on the plans."

"RETAINING WALL NO. 374L (Bridge No. 57-RW374L)
A multi-rowed tieback retaining wall of variable height as shown on the plans

RETAINING WALL NO. 376R (Bridge No. 57-1184M)
An earth retaining structure, consisting of a mechanically stabilized embankment (MSE) system."

In the Special Provisions, Section 10-1.02, "ORDER OF WORK," the following paragraphs are added after the first paragraph:

"Complete design of the various phases of the project will be provided to the Contractor in conformance with the provisions in Section 1, "Specifications and Plans," of these special provisions. Work in any phase of the project shall not begin until the complete design, including final plans, specifications and estimate of quantities, for that phase has been provided to the Contractor by the Engineer.

The work in any phase shall be performed in conformance with the stages of construction shown in the final plans for that phase. Nonconflicting work in subsequent stages within that phase may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction."

In the Special Provisions, Section 10-1.02, "ORDER OF WORK," the following paragraph is added after the second paragraph:

"A first order of work for the Retaining Walls No. 370L and 374L shall include completion of preconstruction shotcrete test panels and placing the order for the soil nail assemblies and tieback anchors."

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In the Special Provisions, Section 10-1.02, "ORDER OF WORK," the following paragraph is added after the twenty-third paragraph:

"The Contractor shall not begin construction of Stages 2D, 2E, and 2F prior to February 1, 2006. Construction of stages 4A and 4B shall not begin until stages 2D, 2E and 2F are completed."

In the Special Provisions, Section 10-1.15, "COOPERATION," the seventh paragraph is revised as follows:

"It is anticipated that work by another contractor (Contract No. 11-080934) to construct managed lanes middle Unit 4 in San Diego County on Route 15 from 0.9 km south of Route 56/15 Separation Overcrossing to 0.1 km north of Route 15/56 Separation Overcrossing (KP M30.4 to KP M31.4) may be in progress adjacent to or within the limits of this project during progress of the work on this contract."

In the Special Provisions, Section 10-1.15, "COOPERATION," the second and third paragraphs are deleted.

In the Special Provisions, Section 10-1.15, "COOPERATION," the fifth paragraph is deleted.

In the Special Provisions, Section 10-1.15, "COOPERATION," the eighth paragraph is deleted.

In the Special Provisions, Section 10-1.15, "COOPERATION," the tenth paragraph is deleted.

In the Special Provisions, Section 10-1.15, "COOPERATION," the following three paragraphs are added after the eleventh paragraph:

"It is anticipated that work by another contractor (Contract No. 11-080924) to construct managed lanes middle Unit 3 in San Diego County on Route 15 from 0.5 km north of Rancho Bernardo Road Undercrossing to 0.7 km south of Via Rancho Parkway Overcrossing (KP M38.7/M42.7) may be in progress adjacent to or within the limits of this project during progress of the work on this project.

It is anticipated that work by another contractor (Contract No. 11-080944) to construct managed lanes middle Unit 5 in San Diego County on Route 15 from 0.7 km south of Rancho Bernardo Road Undercrossing to 0.1 km, north of Clarence Lane Undercrossing (KP M37.4/M44.8) may be in progress adjacent to or within the limits of this project during progress of the work on this project.

It is anticipated that work by another contractor (Contract No. 11-241614) to construct freeway and interchange improvements in San Diego County on Route 15 from 0.8 km south of Camino del norte Undercrossing to 0.8 km north of Rancho Bernardo Road (KP M34.4/M38.9) may be in progress adjacent to or within the limits of this project during progress of the work on this project."

In the Special Provisions, Section 10-1.22, "MAINTAINING TRAFFIC," the following paragraphs are added after fourth paragraph:

"Pedestrian access facilities shall be provided through construction areas within the right of way as shown on the plans and as specified herein. Pedestrian walkways shall be surfaced with asphalt concrete, portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures.

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In addition to the required openings through falsework, pedestrian facilities shall be provided during pile driving, footing, wall, and other bridge construction operations. At least one walkway shall be available at all times. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Precast concrete members shall not be cast, assembled or stored within the right of way of Route 15 or within the median or within 6 meters of the edge of public traveled way. During work on the members, no workers, equipment or materials shall occupy any area within 1.2 m of the edge of the existing pavement except as permitted during lane closures.

Erection of girders over the "SD-15L", Bernardo Center Drive and Rancho Bernardo Road shall be undertaken on one span at a time. During girder erection, public traffic in the lanes over which girders are being placed shall be routed around the work area under the adjacent span over the "SD-15M" by means of a local detour as shown on the plans for the Bernardo Center Drive SB Off-ramp, Bernardo Center Drive and Rancho Bernardo Road.

Erection and removal of falsework at locations where falsework openings are required shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be routed around the work area on adjacent streets or where 2 falsework openings are called for at one location, the public traffic may be routed through the work and through the opening for the opposing lanes of traffic by means of a local detour as shown on the plans. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system. Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Local detours shall be not less than 3 m in width, adjacent to the median side of the opposing traffic lanes, and shall not encroach on the lanes.

Rerouting or stopping traffic during erection or removal of girders and falsework shall be undertaken in conformance with the provisions in "Maintaining Traffic" of these special provisions for the period necessary for erecting or removing the girders and falsework.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect or remove the girders and falsework in any one span or over any one opening prior to detouring or stopping public traffic, and shall erect or remove the girders and falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum."

In the Special Provisions, Section 10-1.22, "MAINTAINING TRAFFIC," the Traffic Chart No.'s 4, 7, 9, 11, 13, and 15 are revised as attached.

In the Special Provisions, Section 10-1.33, "TEMPORARY CRASH CUSHION (ADIEM)," the fifth paragraph is revised as follows:

"The above price will be firm for orders placed on or before July 29, 2005, provided delivery is accepted within 90 days after the order is placed."

In the Special Provisions, Section 10-1.38, "EARTH RETAINING STRUCTURES," subsection, "MATERIALS," under, "Soil Reinforcement," the fifth through the eleventh paragraphs are deleted.

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In the Special Provisions, Section 10-1.38, "EARTH RETAINING STRUCTURES," subsection, "MATERIALS," under, "Drainage System," the following paragraph is added after the first paragraph:

"Plastic pipe located at the vertical drains shall be polyvinyl chloride (PVC) plastic pipe, Schedule 80, conforming to the provisions for pipe for edge drains and edge drain outlets in Section 68-3.02, "Materials," of the Standard Specifications. The vertical drain pipe shall be rigidly supported in place during backfilling operations."

In the Special Provisions, Section 10-1.38, "EARTH RETAINING STRUCTURES," subsection, "MATERIALS," under, "Earthwork," the following paragraph is added after the first paragraph:

"At the locations and to the limits shown on the plans, material below the base of the earth retaining structures shall be removed and replaced with structure backfill material. The relative compaction shall be not less than 95 percent."

In the Special Provisions, Section 10-1.39A, "TIEBACK WALL EARTHWORK," is added following the Section 10-1.39, "CONTROLLED LOW STRENGTH MATERIAL," as attached.

In the Special Provisions, Section 10-1.39B, "SOIL NAIL WALL EARTHWORK," is added following the Section 10-1.39, "CONTROLLED LOW STRENGTH MATERIAL," as attached.

In the Special Provisions, Section 10-1.39C, "SOIL NAIL ASSEMBLY," is added following the Section 10-1.39, "CONTROLLED LOW STRENGTH MATERIAL," as attached.

In the Special Provisions, 10-1.52, "CONCRETE PAVEMENT," subsection, "INSTALLING TIE BARS," the following paragraph is added after the first paragraph:

"Tie bars shall not be installed in the PCC pavement for the Managed Lanes SD-15M Line. All other tie bars shall be installed as shown on the plans."

In the Special Provisions, 10-1.52, "CONCRETE PAVEMENT," subsection, "DOWEL PLACEMENT," the following paragraph is added after the first paragraph:

"Dowels shall not be placed in the PCC pavement for the Managed Lanes SD-15M Line. All other dowels shall be placed as shown on the plans."

In the Special Provisions, Section 10-1.525, "RAPID SET CONCRETE PAVEMENT," which was added per Addendum No. 3, dated April 2, 2004, is replaced with the attached 10-1.525, "CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)."

In the Special Provisions, Section 10-1.54A, "TIEBACK ANCHORS," is added as attached.

In the Special Provisions, Section 10-1.62, "ARCHITECTURAL SURFACE (TEXTURED CONCRETE)," is revised as attached.

In the Special Provisions, Section 10-1.62A, "PREPARE AND STAIN CONCRETE," and Section 10-1.62B, "ANTI-GRAFFITI," are added as attached.

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In the Special Provisions, Section 10-1.64A, "SHOTCRETE," is added as attached.

In the Special Provisions, Section 10-1.82A, "MINOR CONCRETE CHANNEL," and Section 10-1.82B, "MINOR CONCRETE (GUTTER)," are added as attached.

In the Special Provisions, Section 10-1.87, "METAL BEAM GUARD RAILING," subsection "TERMINAL SYSTEM (TYPE SRT)", the fourth and fifth paragraphs are revised as follows:

"Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal (8 post system) from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal (8 post system), FOB Centerville, Utah is \$895.00, not including sales tax.

The above price will be firm for orders placed on or before July 29, 2005, provided delivery is accepted within 90 days after the order is placed."

In the Special Provisions, Section 10-1.92, "CRASH CUSHION (REACT)," the fourth paragraph is revised as follows:

"The price quoted by the manufacturer for Crash Cushion (REACT 9SCBS), FOB Pell City, Alabama is \$31,545, not including sales tax."

In the Special Provisions, Section 10-3.01, "DESCRIPTION," the following paragraph is added after the first paragraph:

"Conduit in the Abutment 1 and Abutment 4 at Bernardo Center Drive UC (Widen/Replace) (Bridge No. 57-1118L) for the barrier transfer machine guidance wire shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions. Full compensation for the conduit shall be considered as included in the various types of work involved and no separate payment will be allowed therefor."

In the Proposal and Contract, the Engineer's Estimate Items 2, 27, 28, 41, 64, 66, 67, 72, 126, 127, 132, 133, 149, 195, 208, 209, 214, 215, 224, 225, 226, 227, 241, 242, and 243 are revised, Items 257 through 278 are added and Items 166, 213, 216, and 256 are deleted as attached.

To Proposal and Contract book holders:

Replace the entire Engineer's Estimate in the Proposal with the attached revised Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Attached are copies of the Material Information

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the proposal.

Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

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This office is sending this addendum by UPS overnight mail to Proposal and Contract book holders to ensure that each receives it. A copy of this addendum and the modified wage rates are available for the contractor's use on the Internet Site:

http://www.dot.ca.gov/hq/esc/oe/weekly_ads/addendum_page.html

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL, Chief
Office of Plans, Specifications & Estimates
Office Engineer

Attachments

5-1.23 INTERNET DAILY EXTRA WORK REPORT

Daily extra work reports shall be submitted in conformance with the provisions in Section 9-1.03C, "Records," of the Standard Specifications and these special provisions.

The Contractor shall send daily extra work reports to the Engineer using the Department's Internet extra work billing system. The reports shall conform to the requirements in the "iCAS User's Guide." The Guide is available from the Department, and is also found on the Internet at http://www.dot.ca.gov/hq/construc/ewb/EWB_INSTRUCTION.pdf. The Department will provide system accounts to the Contractor's authorized representatives when at least one of the representatives has received training. The Department will provide system training to at least one of the Contractor's authorized representatives within 30 days of the Contractor's request for training.

The Department will assign an account and user identification to the Contractor's authorized representative(s), and each Contractor's authorized representative shall maintain a unique password. A daily extra work report that the Contractor's authorized representative sends to the Department using the Internet extra work billing system will be considered signed by the Contractor. A daily extra work report that the Engineer approves using the Internet extra work billing system will be considered signed by the Engineer.

Daily extra work reports that include materials shall be substantiated by a valid copy of a vendor's invoice in conformance to the requirements in Section 9-1.03C, "Records," of the Standard Specifications. Each materials invoice shall clearly identify the relative daily extra work report and the associated cost of the materials. In addition to postal service and parcel service and if approved by the Engineer, invoices may be sent by FAX or as an electronic-mail attachment.

The Contractor shall maintain the Contractor's interface with the Department's Internet extra work billing system. Extra Work Reports submitted by the file transfer process shall conform to the Department's specified file transfer format and process.

Full compensation for furnishing daily extra work reports using the Department's Internet extra work billing system shall be included in the various contract items involved, and no separate payment or additional compensation will be made or allowed therefor.

**Chart No. 7
Ramp Lane Requirements**

Direction: Southbound SD - 15 Location: SB Off-ramp to Bernardo Center Dr;
SB Off-ramp to Rancho Bernardo Rd

FROM HOUR TO HOUR	a.m.												p.m.												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	R	R	R	R	R																				
Fridays																							R	R	R
Saturdays	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Sundays	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Day before designated legal holiday																									
Designated legal holidays																									

Legend:
 Ramp may be closed
 No work that interferes with public traffic will be allowed

REMARKS:

- This chart shall be used once only for each ramp.**

Detour SB RTE 15 Off-ramp to Bernardo Center Dr
 Detour SB RTE 15 Off-ramp to Bernardo Center Dr traffic via southerly on RTE 15 to SB RTE 15 Off-ramp to Camino Del Norte thence westerly on Camino Del Norte to Bernardo Center Dr.

Place a PCMS (Portable Changeable Message Sign) on SB RTE 15 N. of Rancho Bernardo Rd. warning traffic of ramp closure/detour ahead.

Detour SB RTE 15 Off-ramp to Rancho Bernardo Rd
 Detour SB RTE 15 Off-ramp to Rancho Bernardo Rd traffic via southerly on RTE 15 to SB RTE 15 off-ramp to Bernardo Center Dr thence easterly on Bernardo Center Dr to Rancho Bernardo Rd.

Place a PCMS (Portable Changeable Message Sign) on SB RTE 15 N. of W. Bernardo Dr / Pomerado Rd warning traffic of ramp closure/detour ahead.

KP: M 37.224;
 M 38.476

**Chart No. 9
Road Closure Requirements**

Direction: Eastbound "Bernardo Center Dr."	Location: At RTE 15																										
FROM HOUR TO HOUR	a.m.												p.m.														
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
Mondays through Thursdays	R	R	R	R	R																				R	R	R
Fridays	R	R	R	R	R																						
Saturdays				R	R	R	R	R	R	R	R																
Sundays				R	R	R	R	R	R	R	R														R	R	R
Day before designated legal holiday	R	R	R	R	R																						
Designated legal holidays																											

Legend:
 R Road closed
 No lane closure allowed

REMARKS:

*** Close EB Bernardo Center Dr. at Camino Del Norte and at West Bernardo Dr.**

Detour EB Bernardo Center Dr. to RTE 15
 Detour EB Bernardo Center Dr. to RTE 15 traffic via easterly on Bernardo Center Dr. to Camino Del Norte thence easterly on Camino Del Norte to RTE 15.

Detour EB Bernardo Center Dr. traffic from West Bernardo Dr. to RTE 15
 Detour EB Bernardo Center Dr. traffic at West Bernardo Dr. to RTE 15 via southerly on West Bernardo Dr. to WB Bernardo Center Dr. thence westerly on Bernardo Center Dr. to Camino Del Norte thence easterly on Camino Del Norte to RTE 15.

Place a PCMS (Portable Changeable Message Sign) on EB Bernardo Center Dr. W. of Camino Del Norte and on SB West Bernardo Dr. N. of Bernardo Center Dr. warning traffic of RTE 15 detours ahead.

This chart shall be used for falsework erection, falsework removal and bridge demolition only.
 KP:

**Chart No. 11
Road Closure Requirements**

Direction: Westbound "Bernardo Center Dr."	Location: At RTE 15
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FROM HOUR TO HOUR	a.m.											p.m.															
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
Mondays through Thursdays	R	R	R	R	R																				R	R	R
Fridays	R	R	R	R	R																						
Saturdays				R	R	R	R	R																			
Sundays				R	R	R	R	R																	R	R	R
Day before designated legal holiday	R	R	R	R	R																						
Designated legal holidays																											

Legend:

R	Road may be closed
	No lane closure allowed

REMARKS:

*** Close WB Bernardo Center Dr. at Rancho Bernardo Rd.**

Detour WB Bernardo Center Dr. to RTE 15
 Detour WB Bernardo Center Dr. to RTE 15 traffic via southerly on Bernardo Center Dr. to Rancho Bernardo Rd. thence westerly on Rancho Bernardo Rd. to RTE 15.

Place a PCMS (Portable Changeable Message Sign) on SB Bernardo Center Dr. N. of Rancho Bernardo Rd. warning traffic of road closure and RTE 15 detours ahead.

This chart shall be used for falsework erection, falsework removal and bridge demolition only.

KP:

**Chart No. 13
Road Closure Requirements**

Direction: Eastbound "Rancho Bernardo Rd."	Location: At RTE 15
---	---------------------

FROM HOUR TO HOUR	a.m.											p.m.														
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Mondays through Thursdays	R	R	R	R	R																				R	R
Fridays	R	R	R	R	R																					
Saturdays				R	R	R	R	R	R																	
Sundays				R	R	R	R	R	R															R	R	R
Day before designated legal holiday	R	R	R	R	R																					
Designated legal holidays																										

Legend:

<input type="checkbox" value="R"/>	Road may be closed
<input type="checkbox"/>	No lane closure allowed

REMARKS:

*** Close EB Rancho Bernardo Rd. at West Bernardo Dr.**

Detour EB Rancho Bernard Rd. to RTE 15
 Detour EB Rancho Bernardo Rd. to RTE 15 traffic via easterly on Rancho Bernardo Rd. to West Bernardo Dr. thence southerly on West Bernardo Dr. to Bernardo Center Dr. thence easterly on Bernardo Center Dr. to RTE 15.

Place a PCMS (Portable Changeable Message Sign) on EB Rancho Bernardo Rd. W. of West Bernardo Dr. warning traffic of RTE 15 detour ahead.

This chart shall be used for falsework erection, falsework removal and bridge demolition only.

KP: M 38.121

**Chart No. 15
Road Closure Requirements**

Direction: Westbound "Rancho Bernardo Rd."	Location: At RTE 15
---	---------------------

FROM HOUR TO HOUR	a.m.											p.m.															
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
Mondays through Thursdays	R	R	R	R	R																				R	R	R
Fridays	R	R	R	R	R																						
Saturdays				R	R	R	R	R	R	R	R																
Sundays				R	R	R	R	R	R	R	R														R	R	R
Day before designated legal holiday	R	R	R	R	R																						
Designated legal holidays																											

Legend:
 R Road may be closed
 No lane closure allowed

REMARKS:
*** Close WB Rancho Bernardo Rd. at Bernardo Center Dr.**

Detour WB Rancho Bernardo Rd. to RTE 15
 Detour WB Rancho Bernardo Rd. to RTE 15 traffic via westerly on Rancho Bernardo Rd. to Bernardo Center Dr. thence southerly on Bernardo Center Dr. to RTE 15.

 Place a PCMS (Portable Changeable Message Sign) on WB Rancho Bernardo Rd. E. of Bernardo Center Dr. warning traffic of RTE 15 detours ahead.

This chart shall be used for falsework erection, falsework removal and bridge demolition only.

 KP: M 38.121

10-1.39A TIEBACK WALL EARTHWORK

Tieback wall earthwork consisting of excavating for tieback wall construction and backfilling around completed tieback walls, shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions. Attention is directed to "Tieback Anchors" of these special provisions.

The Contractor shall submit to the Engineer working drawings for the proposed method of tieback wall construction for the site in conformance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. One set of the drawings and one copy of the design calculations shall be furnished to the Engineer.

Working drawings for tieback wall earthwork shall contain all information required for the construction and quality control of the earthwork, including the following:

- A. The proposed schedule and detailed construction sequence. Construction sequence shall include measures to ensure wall and slope stability during various stages of wall construction including provisions for discontinuous rows of nails or anchors.
- B. Methods of excavation to the staged lifts indicated and excavation equipment types.
- C. Temporary shoring plans.
- D. Drilling methods and equipment including proposed drill hole size and any variation of the these along the alignments.
- E. Information on space requirements for installation equipment.
- F. A detailed construction dewatering plan addressing all elements necessary to divert, control, and dispose of surface water, and ground water.

The Contractor shall allow four weeks after complete drawings and all support data are submitted for the review and approval of the proposed method of tieback wall construction.

Excavation and shotcrete placement for the tieback retaining wall shall not start until the Engineer has reviewed and approved the working drawings for the associated tieback retaining wall as specified in "Tieback Anchors" of these special provisions.

In the event the Engineer fail to complete the review and approval within the time allowed and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the manner as provided in Section 8-1.09, "Right of Way Delays."

The Contractor shall only excavate enough area that can be stabilized, prepared and covered with the shotcrete during the same work shift. Care shall be taken to minimize disturbing the natural foundation materials behind the excavation face and removing loosened areas of the face before shotcrete is applied.

The Contractor shall immediately notify the Engineer if raveling or local instability of the final wall face excavation occurs. Unstable areas shall be temporarily stabilized. Structure excavation work shall be suspended in unstable areas until remedial measures, submitted by the Contractor and approved by the Engineer, have been taken.

The Contractor shall protect installed tieback anchors during excavation and subsequent operations. Any tieback anchors damaged during construction shall be replaced by the Contractor, at the Contractor's expense.

The Contractor shall remove all cobbles, boulders, rubble, or debris which are encountered at the final wall alignment during wall face excavation and which protrude from the excavated face more than 13 mm into the design shotcrete thickness as shown on the plans. Such over excavation shall be backfilled with shotcrete.

Geocomposite Drain

The geocomposite drain shall conform to the details shown on the plans and the following:

- A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
- B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.

- C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
- D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
- E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
- F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.
- G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
- H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.
- I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.
- J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.
- K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250 μ m thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

MEASUREMENT AND PAYMENT

Measurement and payment for structure excavation (tieback wall) and structure backfill (tieback wall) shall conform to the provisions in Sections 19-3.07, "Measurement," and 19-3.08, "Payment," of the Standard Specifications and these special provisions.

Full compensation for working drawings and supplements, and shoring, if required, for tieback wall construction shall be considered as included in the contract price paid per cubic meter for structure excavation (tieback wall) and no additional compensation will be allowed therefor.

Full compensation for furnishing and installing geocomposite drain, filter fabric and drainage piping shall be considered as included in the contract unit price paid per cubic meter for structure excavation (tieback wall) and no additional compensation will be allowed therefor.

Full compensation for shotcrete used to fill voids created by the removal of cobbles and boulders or other obstructions shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.39B SOIL NAIL WALL EARTHWORK

Soil nail wall earthwork, consisting of excavating for soil nail wall construction and backfilling around completed soil nail walls, shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions.

Working Drawings

The Contractor shall submit a complete working drawing submittal for earthwork for each soil nail wall to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Working drawings for soil nail wall earthwork shall be 559 mm by 864 mm in size. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction.

Working drawings for wall earthwork shall show the State assigned designations for the contract number, structure number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post on each drawing and calculation sheet. The Contractor's name, address, and telephone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner.

The working drawings for soil nail wall earthwork shall contain all information required for the construction and quality control of the earthwork, including the following:

- A. A proposed schedule and detailed construction sequence. Construction sequence shall include measures to ensure wall and slope stability during all stages of wall construction including provisions for discontinuous rows of soil nails.
- B. Methods of excavation to the staged lifts indicated and types of excavation equipment.
- C. Temporary shoring plans.
- D. Drilling methods and equipment including proposed drill hole size and any variation of these along the alignments.
- E. Information on space requirements for installation equipment.
- F. A detailed construction dewatering plan addressing all elements necessary to divert, control, and dispose of surface water and ground water.

A supplement to the working drawings shall include the following:

- A. Independently checked calculations for wall and slope stability during all stages of wall construction including geotechnical assessment of information provided by the Department for this contract. At the Contractor's option, the Contractor may conduct additional geotechnical investigation for the purpose of developing soil nail wall earthwork working drawings.
- B. Information on provisions for working in the proximity of underground facilities.

The working drawings and supplement shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall allow the Engineer 4 weeks to review the working drawings and supplement after a complete submittal has been received.

Should the Engineer fail to review the complete working drawing submittal within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the soil nail wall earthwork working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Excavation

Care shall be taken during excavation for soil nail walls to prevent disturbing the natural foundation materials behind the face of excavation. During initial mass grading, the Contractor shall not excavate the full wall height to the wall alignment as shown on the plans, but the Contractor shall maintain a working berm of native material in front of the wall to serve as a work bench for the drill equipment. The working berm shall extend out from the wall a minimum distance of 6 m and shall be cut down from that point at the slope shown on the approved wall earthwork working drawings. The original ground beyond the wall alignment for the back or ends of the wall as shown on the plans shall not be over excavated. Any such over excavation shall be restored by the Contractor, at the Contractor's expense, using methods and materials approved in writing by the Engineer. Soil stabilization methods or temporary backing or lagging placed behind the excavation face may be required to prevent disturbing the natural foundation materials.

Excavation for walls shall be limited to that area which can be nailed and covered with shotcrete during the same work shift in which the excavation is done. Subsequent excavation shall not be made within 3 m of previously nailed and covered portions of the wall until those nailed and covered portions are structurally complete. A portion of the wall will be considered structurally complete when the soil nail assemblies have been installed, the shotcrete cover has set, specified testing has been completed for that portion of the wall, and the test results have been furnished to the Engineer.

Excavation to the final wall alignment for the full wall height shall incorporate a working berm which shall be constructed from the top down in a staged lift sequence as shown on the approved wall earthwork working drawings. The ground level in front of the wall face shall not be excavated more than one meter below the level of the row of soil nails to be installed in that same lift.

At the option of the Contractor, in addition to the working berm described above, the Contractor may maintain a stabilizing berm of undisturbed material to support the excavation face during soil nail installation. The stabilizing berm shall extend horizontally from the bottom of the shotcrete a minimum distance of 0.3-m and shall be cut down from that point at a slope as shown on the approved wall earthwork working drawings.

After soil nails are complete in place for a given lift, the stabilizing berm shall be removed during excavation to the final wall alignment. The complete excavated face shall be cleaned of all loose materials, mud, rebound, and other materials that could prevent or reduce shotcrete bond to the excavated face and soil nails.

Temporary backing or lagging for excavation at soil nail walls may be left in place if approved in writing by the Engineer. There shall be no voids behind temporary backing or lagging that is left in place. Fillers used to eliminate voids between the excavation face and temporary backing or lagging shall be dimensionally stable, non-deteriorating material capable of supporting the earth pressures in both water saturated and dry conditions.

The Contractor shall remove all cobbles, boulders or portions of boulders, rubble, or debris which are encountered at the final wall alignment during wall face excavation and which protrude from the excavated face more than 50 mm into the design shotcrete thickness as shown on the plans. Such over excavation shall be backfilled with shotcrete.

The Contractor shall immediately notify the Engineer of the occurrence of raveling or local instability of the final wall face excavation due to the presence of groundwater, soil conditions, equipment vibration, or other causes.

Unstable areas shall be temporarily stabilized by means of buttressing the exposed excavation face with an earth berm or other methods approved in writing by the Engineer. Construction of the wall in unstable areas shall be suspended until remedial measures, submitted by the Contractor, and approved by the Engineer, have been taken.

The Contractor shall immediately notify the Engineer if raveling or local instability of the final wall face excavation occurs. Unstable areas shall be temporarily stabilized. Structure excavation work shall be suspended in unstable areas until remedial measures, submitted by the Contractor and approved by the Engineer, have been taken.

The Contractor shall protect installed soil nails during excavation and subsequent operations. Any soil nails damaged during construction shall be replaced by the Contractor, at the Contractor's expense.

Geocomposite Drain

The geocomposite drain shall conform to the details shown on the plans and the following:

- A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
- B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 239 kPa.

- C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
- D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
- E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
- F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.
- G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
- H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.
- I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.
- J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.
- K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250 μ m thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

Measurement and Payment

Excavation and backfill for soil nail wall construction will be measured and paid for as structure excavation (soil nail wall) and structure backfill (soil nail wall).

Full compensation for furnishing and installing geocomposite drain, filter fabric and drainage piping shall be considered as included in the contract price paid per cubic meter for structure excavation (soil nail wall) and no additional compensation will be allowed therefor.

Full compensation for working drawings and supplements, and for furnishing, constructing and removing shoring, working berms, and stabilizing berms, if required, for soil nail wall construction shall be considered as included in the contract price paid per cubic meter for structure excavation (soil nail wall) and no additional compensation will be allowed therefor.

Full compensation for shotcrete used to fill voids created by the removal of cobbles and boulders or other obstructions shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.39C SOIL NAIL ASSEMBLY

Soil nail assemblies and test soil nail assemblies, consisting of drilling holes in natural foundation materials, installing and grouting steel bars in drilled holes, anchorage systems, and testing of test soil nail assemblies, shall conform to the details shown on the plans, the provisions of the Standard Specifications, and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Order of Work" and "Soil Nail Wall Earthwork" of these special provisions.

WORKING DRAWINGS

The Contractor shall submit a complete working drawing submittal for soil nail assemblies to the Office of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for soil nail assemblies shall be 559 mm by 864 mm in size. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to OSD for final approval and use during construction.

Working drawing submittals for soil nail assemblies shall show the State assigned designations for the contract number, structure number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer post on each drawing and calculation sheet. The Contractor's name, address, and phone and FAX numbers shall also be shown on the working drawings. Each working drawing sheet shall be numbered in the lower right hand corner of the sheet.

The working drawing submittal for soil nail assemblies shall contain all information required for the construction and quality control of the soil nail wall, including the following:

- A. The proposed schedule and detailed construction sequence of the installation and grouting of soil nails, application of shotcrete, and construction of cast-in-place reinforced concrete.
- B. Complete details and specifications of the soil nail and test soil nail, including encapsulation materials and method of grouting the encapsulation, anchorage system, and type of packers or other appropriate devices to be used to ensure partial length grouting of test soil nails.
- C. Grout mix designs and procedures involved in testing grout.
- D. Grout placement procedures and equipment including minimum required cure time.
- E. Details of the equipment proposed for testing soil nails, including jacking frame and appurtenant bracing, and the method and equipment for determining any displacement of the test soil nail relative to the grout during application of test loads.
- F. Information on space requirements for installation equipment.
- G. Drilling methods and equipment.

The working drawing submittal shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall allow the Engineer 4 weeks to review the soil nail working drawings after a complete submittal has been received. No soil nails shall be fabricated or installed until the Engineer has approved, in writing, the working drawing submittal for soil nail assemblies.

Should the Engineer fail to review the complete working drawing submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the soil nail working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MATERIALS

The materials specified below shall be used for construction of soil nail assemblies and test soil nail assemblies.

Soil Nail

Soil nails shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement," of the Standard Specifications. When Grade 420 soil nails are shown on the plans, the soil nails shall also conform to the requirements in ASTM Designation: A 615/A 615M or A 706/A 706M. When Grade 520 soil nails are shown on the plans, the soil nails shall also conform to the requirements in ASTM Designation: A 615/A 615M. The soil nail shall be a reinforcing bar encapsulated full length in a grouted corrugated plastic sheathing. The bar shall be centered in the sheathing and the space between the sheathing and the bar shall be filled with grout.

Soil nail assemblies shall be lengthened or additional soil nail assemblies shall be installed when ordered by the Engineer. The lengthening or addition of soil nail assemblies, when ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Soil nails shall have a minimum length of 150 mm of thread on the anchorage end. Threading may be continuous spiral deformed ribbing provided by the bar deformations or may be cut into a reinforcing bar. If threads are cut into a reinforcing bar, the bar size shall be the next larger bar designation number from that shown on the plans and coarse threads shall be used. The epoxy coating at the anchorage end of epoxy coated bars may be omitted for a maximum length of 150 mm. Metal surfaces of assembled splices of epoxy coated bars shall be epoxy coated.

Corrugated plastic sheathing shall be either polyvinyl chloride (PVC) or high density polyethylene (HDPE). The minimum sheathing wall thickness shall be 1.0 mm.

HDPE shall have a density between 0.940 and 0.960-g/cm³ when measured in conformance with the requirements in ASTM Designation: D 792, A-2.

The sheathing shall have sufficient strength to prevent damage during construction operations and shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete.

Splicing of soil nails shall be made only at the locations shown on the plans or at ends of soil nails which the Engineer has ordered to be lengthened.

Test Soil Nail

Test soil nails shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement," of the Standard Specifications, and shall be of a size and grade determined by the Contractor.

Test soil nail assemblies shall be lengthened or additional test soil nail assemblies shall be installed when ordered by the Engineer. The lengthening or addition of test soil nail assemblies, when ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Test soil nails need not be epoxy coated or encapsulated in grouted plastic sheathing.

Splicing of test soil nails shall be made only at locations outside of the bonded length.

Anchorage System

Anchorage for soil nails shall conform to the details shown on the plans and the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications, except that nuts, washers, wedges, and bearing plates to be fully encased in concrete, grout, or shotcrete need not be galvanized. Concrete anchors on the bearing plates shall conform to the provisions for stud connectors in Section 55-2, "Materials," of the Standard Specifications.

The ultimate strength of the soil nail anchorage shall be at least the value shown below for the size of the soil nail bar shown on the plans.

BAR SIZE	ANCHORAGE ULTIMATE STRENGTH (kilonewtons)	
	Grade 420	Grade 520
No. 16	123	137
No. 19	178	198
No. 22	240	267
No. 25	314	350
No. 29	401	446
No. 32	508	565

Grout

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. California Test 541 will not be required nor will the grout be required to pass through a screen with a 1.80-mm maximum clear opening prior to being introduced into the grout pump. Fine aggregate may be added to the grout mixture of portland cement and water in drilled holes 150 mm or greater in diameter, but only to the extent that the cement content of the grout is not less than 600 kilograms per cubic meter of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications. Grout with fine aggregate shall have a nominal penetration equal to or greater than 90 mm when measured in conformance with California Test 533, and shall have an air content of equal to or less than 2 percent when measured in conformance with California Test 504. Air entraining admixtures shall not be used for grout with fine aggregate.

The consistency of grout with fine aggregate shall be verified prior to use by producing a batch to be tested. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of grout in the soil nails. Grout for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. The test batch shall demonstrate that the proposed grout mix achieves the specified nominal penetration. Upon completion of the testing, the grout shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

CONSTRUCTION

Soil nails shall be installed in drilled holes in an expeditious manner so that caving or deterioration of the drilled hole does not occur. No portion of the drilled hole shall be left open for more than 60 minutes prior to soil nail placement and grouting unless otherwise approved by the Engineer.

Difficult soil nail assembly construction is anticipated due to the presence of caving soils, ground water, cobbles and boulders, the requirements of soil nail assembly embedment into natural foundation materials, sound control, and traffic control.

Drilling

Drilling equipment shall be designed to drill straight and clean holes. The drilling method and the size and capability of the drilling equipment shall be as approved in the working drawings. Drill rigs shall have the capability of anchorage installation and grout placement through the use of drill casing or hollow-stem augers.

At locations where caving conditions are anticipated, sufficient casing and auger lengths shall be available on site to maintain uninterrupted installation of anchors.

At locations where hard drilling conditions such as rock, cobbles, boulders, or obstructions are anticipated, a down hole pneumatic hammer drill rig and drill bit shall be available on site to drill holes for soil nail assemblies.

Drilled holes for walls shall not extend beyond the right-of-way or easement limits as shown on the plans or as specified in these special provisions.

Holes shall be drilled in the natural foundation materials. Holes for test soil nail assemblies shall be of the same diameter as those for the production soil nail assemblies they represent.

Holes shall be cleaned to remove material resulting from the drilling operations and to remove any other material that would impair the strength of the soil nail assemblies or test soil nail assemblies. Foreign material dislodged or drawn into the holes during construction of the assemblies shall be removed. Water for cleaning holes shall not be used, unless full hole length hollow-stem augers or casing is maintained in the same hole during cleaning and soil nail assembly installation. Soil nail assemblies and test soil nail assemblies shall not be installed in the drilled holes until the holes have been inspected by the Engineer.

Installing Soil Nails and Test Soil Nails

Soil nails and test soil nails shall be installed in the drilled holes using centralizers. Centralizers shall adequately support the bar in the center of the drilled hole and shall be spaced at a maximum of 1.5 m on center along the length of the bar, and 0.5-m from the end of the bar.

Where the soil nail cannot be completely inserted, the Contractor shall remove the bar and clean or redrill the hole to permit unobstructed installation. Partially installed bars shall not be driven or forced into the drilled hole and will be rejected. When open-hole drilling methods are being used, the Contractor shall have hole cleaning tools on-site suitable for cleaning drilled holes along their full length just prior to bar insertion and grouting.

Grouting

The length of drilled hole shall be verified and recorded by the Contractor before grouting.

Grout shall be injected at the low end of the drilled hole and shall fill the drilled hole with a dense grout free of voids or inclusion of foreign material. Cold joints shall not be used in grout placement. Soil nails shall be grouted full length.

Only the bonded length of test soil nails shall be initially grouted. Initial grouting shall be confined to the bonded length by packers or other approved devices. For test soil nails, grouting of the remainder of the drilled hole shall not be done until pullout tests have been completed and approved by the Engineer.

After placing the grout for soil nails and test soil nails, they shall remain undisturbed for the cure time stated in the approved soil nail working drawings.

Securing Soil Nails

Any remaining void at the exterior end of the drilled hole for a soil nail assembly shall be filled with shotcrete and the soil nail secured at the face of the shotcrete. The steel bearing plate shall be seated with full bearing on the shotcrete surface and the nut for the soil nail shall be hand tightened before the initial set of the shotcrete. The nut shall be made wrench tight after the shotcrete has set for 24 hours, unless a shorter time is approved by the Engineer.

Securing Test Soil Nails

Testing shall be performed against a temporary bearing yoke which bears directly on the shotcrete facing. Test loads transmitted through the temporary bearing yoke shall not fracture the shotcrete or cause displacement or sloughing of the soil surrounding the drilled hole. No part of the yoke shall bear within 150 mm of the edge of blockout.

Test soil nails shall be removed to behind the front face of the shotcrete after testing has been completed. The remaining length of void in the drilled hole shall be grouted and the blockout in the shotcrete facing filled with either grout or shotcrete.

TESTING

Test soil nail assemblies shall be pullout tested by the Contractor in the presence of the Engineer. A pullout test shall consist of incrementally loading the assembly until either the pullout test load has been held for one minute or the total measured movement of the soil nail exceeds 50 mm, at which point the load shall be recorded as part of the test data and submitted to the Engineer at the conclusion of each test.

The Contractor shall monitor and record total movement of the test soil nail relative to the grout during application of the test load.

Applied test loads shall be determined by using either a calibrated pressure gage or a load cell. Movements of the end of the soil nail, relative to an independent fixed reference point, shall be measured and recorded to the nearest 25 μ m at each increment of load, including the ending alignment load, during the load tests.

The pressure gage shall have an accurately reading dial at least 150 mm in diameter. Each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will have at final jacking force, and shall be accompanied by a certified calibration chart. Each jack and pressure gage assembly shall be calibrated in conformance with Section 50-1.08, "Prestressing," of the Standard Specifications. The load cell shall be calibrated and shall be provided with an indicator capable of measuring the test load in the soil nail. The range of the load cell shall be such that the lower 10 percent of the manufacturer's rated capacity will not be used in determining the jacking force.

The test load may be verified by State forces with either State-furnished load cells or pressure cells, or with State-furnished Vibra-Tension equipment operated in conformance with the requirements of California Test 677. The Contractor shall provide sufficient labor, equipment, and material to install and support such testing equipment at the soil nails and to remove the testing equipment after the testing is complete, as ordered by the Engineer.

The pullout test procedures shall conform to the following:

- A. The pullout test shall be conducted by measuring and recording the test load applied to the test soil nail and the test soil nail end movement at each load listed in the following loading schedule.

PULLOUT TEST LOADING SCHEDULE

AL
0.20M
0.30M
0.40M
0.50M
0.60M
0.70M
0.80M
0.90M
1.00M (PULLOUT TEST LOAD)
AL

(M = MAXIMUM TEST LOAD (kN) = 0.0141 σ_b D)

Where σ_b =Ultimate bond stress between grout and drilled hole as shown on the plans, in kPa; and D=actual drilled hole diameter, in millimeters.

(AL = ALIGNMENT LOAD = 0.1M)

- B. Each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes, except that the load equal to 0.70M shall be held for 10 minutes. During the 10-minute load hold, the movement of the end of the soil nail shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. The observation period for the 10-minute load hold shall start when the pump begins to apply the increment of load from 0.60M to 0.70M. If the creep movement measured between one minute and 10 minutes at 0.70M is less than one mm, the load shall continue to be increased incrementally to 1.00M, then reduced to the ending alignment load. The test soil nail assembly shall be considered acceptable if 1) the creep movement measured between one minute and 10 minutes is less than one mm, 2) the total measured movement is greater than 80 percent of the theoretical elastic elongation of the test nail unbonded length at the 1.0M load, and 3) the total measured movement is less than 50 mm.
- C. If the load of 0.70M cannot be maintained for 10 minutes with one mm or less creep movement, the 0.70M load shall be maintained for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the test load is held for 60 minutes, a creep curve showing the creep movement between 10 minutes and 60 minutes shall be plotted as a function of the logarithm of time. If the creep curve plotted from the movement data indicates a creep rate of less than 2.0 mm for the last log cycle of time, the load shall continue to be increased incrementally to 1.00M, then reduced to the ending alignment load. The test soil nail assembly shall be considered acceptable if 1) the creep curve plotted from the movement data indicates a creep rate of less than 2.0 mm for the last log cycle of time, 2) the total measured movement is greater than 80 percent of the theoretical elastic elongation of the test nail unbonded length at the 1.0M load, and 3) the total measured movement is less than 50 mm.
- D. The soil nail shall be unloaded only after completion of the test.

Test soil nails that fail to meet acceptance criteria shall be extracted when requested by the Engineer. Full compensation for extracting test soil nails shall be considered as included in the contract price paid per meter for soil nail assembly, and no separate payment will be made therefor.

The Contractor shall furnish to the Engineer complete test results for each soil nail assembly tested. Data for each test shall list key personnel, test loading equipment, test soil nail location, hole diameter and depth, bond length, type of soil, method of drilling, and amount of ground water encountered within the bond length. Test data shall also include the dates and times of drilling, test soil nail installation, grouting, and testing. The test load and amount of displacement shall be included in the test data when any displacement of the test soil nail relative to the grout occurs during application of the test load.

MEASUREMENT

Soil nail assembly and test soil nail assembly will be measured and paid for by the meter. The length to be paid for will be the length of soil nail assembly or test soil nail assembly measured along the bar centerline from the back face of shotcrete to the tip end shown on the plans or ordered in writing by the Engineer.

PAYMENT

The contract price paid per meter for soil nail assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the soil nail assemblies, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Test soil nail assemblies will be paid for as soil nail assembly.

Full compensation for testing of the test soil nail assemblies shown on the plans shall be considered as included in the contract price paid per meter for soil nail assembly, and no separate payment will be made therefor.

Full compensation for repair of all damage to existing structures, restoration of grade in subsided areas, and all other damage done by drilling shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

Full compensation for furnishing, installing, and removing casing shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

The quantities of trial batch grout will not be included in any contract item of work, and full compensation for furnishing, producing, and disposing of trial batches shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

10-1.525 CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)

Concrete pavement (Rapid Strength Concrete) shall consist of constructing rapid strength concrete (RSC) pavement as shown on the plans and in conformance with Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and Concrete Pavement of these special provisions.

DEFINITIONS

The following definitions shall apply to this section:

- A. EARLY AGE. – A time less than 10 times the final set time of the concrete.
- B. FINAL SET TIME. – The elapsed time after initial contact of cement and water, or accelerator, if used, at which a specific penetration resistance of 27.6 MPa is achieved in conformance with the requirements in ASTM Designation: C 403.
- C. OPENING AGE. – The age at which the concrete will achieve the specified strength for opening to public or Contractor traffic.

PRE-PAVING CONFERENCE

The Contractor and subcontractors involved in construction operations of RSC shall meet with the Engineer at a pre-paving conference, at a mutually agreed time, to discuss methods of accomplishing all phases of the construction operation, contingency planning, and standards of workmanship for the completed item of work.

The Contractor shall provide the facility for the pre-paving conference. The Contractor's superintendent, foremen, subcontractors, field staff, plant personnel including plant supervisors, manager, and operator involved with RSC shall attend the pre-paving conference. The Contractor shall submit a list of participants to the Engineer for approval. The complete listing shall identify each participant's name, employer, title and role in construction of RSC. The pre-paving conference shall be held for no less than 2 hours. Construction operations of RSC shall not begin until the specified personnel have completed the mandatory pre-paving conference.

TEST STRIP

Initial test strip(s) will not be required for RSC pavement.

JUST-IN-TIME TRAINING

Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on rapid strength concrete. Construction operations for rapid strength concrete shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel included in the list of participants for the Pre-Operation Conference along with the Engineer's representatives shall attend JITT.

The JITT session will be conducted for not less than 4 hours on rapid strength concrete. The training class may be an extension of the Pre-Operation Conference and shall be conducted at the project field location convenient for both the Contractor's and the Engineer's project staffs. Scheduling and completion of the JITT session shall be completed at least 5 working days prior to the start of construction of rapid strength concrete. The class shall be held during normal working hours.

The JITT instructor shall be experienced in the construction methods, materials, and test methods associated with rapid strength concrete. The instructor shall not be an employee of the Contractor or a member of the Engineer's field staff. A copy of the syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. Selection of the course instructor, the course content and training site shall be as mutually agreed to by the Contractor and the Engineer. The instructor shall issue a certificate of completion to the participants upon the completion of the class. The certificate shall include the course title, date and location of the class, the name of the participant, instructor's name, location and phone number.

The Contractor's or Engineer's personnel involved with rapid strength concrete operations will not be required to attend JITT if they have completed similar training within the previous 12 months of the date of the JITT for this project. The Contractor shall provide a certificate of class completion as described above for each staff member to be excluded from the JITT session. The final determination for exclusion of any staff member's participation will be as determined by the Engineer. All attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The course evaluation form will be provided by the Engineer.

It is expressly understood that Just-In-Time Training shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications.

TRIAL SLAB

Prior to beginning work on concrete pavement (RSC), the Contractor shall successfully complete one or more trial slabs for each RSC mix design to be used in constructing RSC pavement. Trial slabs shall be constructed, finished, cured and tested with the materials, tools, equipment, personnel and methods to be used in completing RSC pavement. Trial slabs shall demonstrate that the Contractor is capable of producing RSC pavement in conformance with the provisions in this section, within anticipated time periods including delivery, placement, finishing and curing times, and under similar atmospheric and temperature conditions expected during operations. Multiple trial slabs for each RSC mix design may be required to envelop variable atmospheric and temperature conditions.

The minimum trial slab dimensions shall be 3 m by 6 m and shall be 230 mm thick where planned pavement nominal thickness is less than 255 mm. The trial slab thickness shall be 260 mm where planned pavement nominal thickness is 255 mm or greater. Where there are planned slab with greater and less than 255 mm thickness then two trial slabs shall be required one at 230 mm thick and one at 260 mm thick. Trial slabs shall be placed near the project site at a location mutually acceptable to the Engineer and the Contractor except slabs shall not be placed on the roadway or within the project limits.

During trial slab construction and within 20 minutes of RSC delivery, beams shall be fabricated in conformance with the requirements in California Test 523. Beams shall be used to determine early age and 7-day modulus of rupture values. Beams fabricated for early age testing shall be cured so that the monitored temperature in the beams and the trial slab are within 3°C at all times. Internal temperatures of trial slab and early age beams shall be monitored and recorded at minimum time intervals of 5 minutes by installing thermocouples and or thermistors connected to strip-chart recorders or digital data loggers. Temperature recording devices shall be accurate to within $\pm 1^\circ\text{C}$. Internal temperature readings shall be measured at 25 mm from the top and 25 mm from the bottom, no closer than 75 mm from any edge of the concrete elements, until early age testing is completed. Beams fabricated for 7-day testing shall be cured in conformance with California Test 523 except they shall be placed into sand at between 5 and 10 times final set time or 24 hours, whichever is earlier. Trial slabs 225 mm thick shall have an early age modulus of rupture of not less than 2.8 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Trial slabs 260 mm thick shall have an early age modulus of rupture of not less than 2.3 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Beams failing early age or 7-day modulus of rupture requirements shall be cause for rejection of the trial slab.

The Contractor may request, in writing, the use of ASTM Designation: C 805 or C 900 to estimate the modulus of rupture of the pavement at early ages, subject to approval by the Engineer. The selected test method shall be used to determine modulus of rupture until 7 days after the Contractor notifies the Engineer of withdrawal of the proposal or 7 days after the Engineer notifies the Contractor of withdrawal of approval, in writing. During trial slab curing, correlation testing shall be performed to determine the relation between the modulus of rupture and ASTM Designation: C 805 or C 900 performed on the trial slab. The correlation shall be established by testing at 4 or more time intervals. At a minimum, tests shall be performed one hour before and one hour after the opening age and two others within 15 minutes of the opening age. Modulus of rupture estimates shall be calculated with either a linear, exponential or logarithmic, least squares best-fit equation, whichever provides the best correlation coefficient.

Materials resulting from construction of trial slabs and test specimens shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

TEMPORARY ROADWAY STRUCTURAL SECTION

Asphalt concrete and aggregate base, equal to the quantity of pavement removed during the work shift, shall be provided on site for construction of a temporary roadway structural section where existing pavement is to be placed. The quantity and location of standby material shall be included in the Contractor's contingency plan in conformance with the requirements of these special provisions. Temporary roadway structural section shall be maintained and later removed as the first order of work when concrete pavement (Rapid Strength Concrete) operations resume. The temporary roadway structural section shall consist of 90-mm thick asphalt concrete over aggregate base. RSC not conforming to these special provisions for RSC may be used for temporary roadway structural section with the Engineer's approval.

Aggregate base for temporary roadway structural section shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel, natural rough-surfaced gravel, reclaimed concrete and sand, or any combination thereof. Grading of aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Asphalt concrete for temporary roadway structural section shall be produced from commercial quality aggregates and asphalt binder. Grading of aggregate shall conform to the 19-mm maximum, medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and asphalt binder shall conform to requirements for liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. Amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3 percent less than the optimum bitumen content determined in conformance with the requirements in California Test 367.

Aggregate base and asphalt concrete for the temporary roadway structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, with a surface of uniform smoothness, texture and density. Surfaces shall be free from pockets of coarse or fine material. Aggregate base may be spread and compacted in one layer. Asphalt concrete may be spread and compacted in one layer. Finished surface of asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m ±0.06 m long straightedge placed parallel with the centerline and shall match the elevation of existing concrete pavement along the joints between the existing pavement and temporary surfacing.

Removed temporary roadway structural section materials shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, except that removed aggregate base may be stockpiled at the project site and reused for construction of temporary roadway structural sections. When no longer required, standby material or stockpiled material for construction of temporary roadway structural sections shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

RAPID STRENGTH CONCRETE

General

Rapid Strength Concrete (RSC) shall be a concrete made with hydraulic cement that develops opening age and 7-day specified modulus of rupture strengths.

Requirements of Sections 40-1.015, "Cement Content," 40-1.05, "Proportioning," and 90-1.01, "Description," of the Standard Specifications and "Pavement Concrete Mix Proportions" of Concrete Pavement of these special provisions shall not apply.

Combined aggregate grading used in RSC shall be either the 37.5-mm, maximum grading, or 25-mm, maximum grading, at the option of the Contractor.

Cement for RSC shall be hydraulic cement as defined in ASTM Designation: C 219 and shall conform to the following requirements:

Test Description	Test Method	Requirement
Contraction in Air	California Test 527, W/C Ratio = 0.39 ± 0.010	0.053 %, max.
Mortar Expansion in Water	ASTM Designation: C 1038	0.04 %, max.
Soluble Chloride*	California Test 422	0.05 %, max.
Soluble Sulfates*	California Test 417	0.30 %, max.
Thermal Stability	California Test 553	60 %, min.
Compressive Strength @ 3 days	ASTM Designation: C 109	17 MPa

*Test is to be done on a cube specimen, fabricated in conformance with the requirements in ASTM Designation: C 109, cured at least 14 days and then pulverized to 100% passing the 300-µm sieve

At least 45 days prior to intended use, the Contractor shall furnish a sample of cement from each lot proposed for use and all admixtures proposed for use in the quantities ordered by the Engineer.

The Contractor shall submit uniformity reports for cement used in RSC to the Engineer. Uniformity reports shall conform to the requirements in ASTM Designation: C 917, except that testing age and water content may be modified to suit the particular material. Uniformity reports shall be submitted at least every 30 days during RSC pavement operations.

Type C accelerating chemical admixtures conforming to the provisions in Section 90-4, "Admixtures," of the Standard Specifications may be used. In addition to the admixtures listed on the Department's current list of approved admixtures, citric acid or borax may be used if requested in writing by the cement manufacturer and a sample is submitted to the Engineer. Chemical admixtures, if used, shall be included in the testing for requirements listed in the table above.

At least 10 days prior to use in the trial slab, the Contractor shall submit a mix design for RSC that shall include the following:

- A. Opening age
- B. Proposed aggregate gradings
- C. Mix proportions of hydraulic cement and aggregate
- D. Types and amounts of chemical admixtures
- E. Maximum time allowed between batching RSC and placing roadway pavement
- F. Range of ambient temperatures over which the mix design is effective (10°C maximum range)
- G. Final set time of the concrete
- H. Any special instructions or conditions, including but not limited to, water temperature requirements when appropriate

The Contractor shall submit more than one mix design to plan for ambient temperature variations anticipated during placement of the roadway pavement. Each mix shall be designed for a maximum ambient temperature range of 10°C. The Contractor shall develop and furnish modulus of rupture development data for each proposed mix design. Modulus of rupture development data for up to 7 days shall be provided to the Engineer prior to beginning paving operations. Modulus of rupture development data may be developed from laboratory prepared samples. The testing ages for modulus of rupture development data shall include one hour before opening age, opening age, one hour after opening age, 24 hours, 7 days and 28 days.

Concrete pavement penetration requirements in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications shall not apply to RSC.

RSC pavement shall develop a minimum modulus of rupture of as specified in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions before opening to public or Contractor traffic. In addition, RSC pavement shall develop a minimum modulus of rupture of 4.2 MPa in 7 days after placement. RSC pavement that attains a modulus of rupture of less than specified may be accepted in conformance with "Pay Factor Adjustment for Low Modulus of Rupture" specified herein. Modulus of rupture shall be determined by averaging results from 3 beam specimens tested in conformance with the requirements in California Test 523. Beam specimens may be fabricated using an internal vibrator in conformance with the requirements in ASTM Designation: C 31. No single test shall represent more than the production of that day or 100 cubic meters, whichever is less.

Modulus of rupture at early age may be estimated using the correlation established during trial slab placement or by using results from beam specimens cured under atmospheric conditions and at a temperature within 3°C of the pavement. Modulus of rupture at other ages will be determined using beams cured and tested in conformance with California Test 523 except beams will be placed into sand between 5 and 10 times final set time or 24 hours, whichever is earlier. The Engineer will perform the testing to determine modulus of rupture values of the RSC pavement. The modulus of rupture, as determined above, will be the basis for accepting or rejecting the RSC pavement for modulus of rupture requirements.

Pay Factor Adjustment for Low Modulus of Rupture

Where pavement nominal thickness is less than 255 mm, payment for concrete pavement (Rapid Strength Concrete) will be adjusted for low modulus of rupture tests as follows:

- A. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.8 MPa or greater before the lane is opened to the traffic and 7-day modulus of rupture of 4.2 MPa or greater will be paid for at the contract price per cubic meter for concrete pavement (Rapid Strength Concrete).
- B. Concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 3.4 MPa will not be paid for, and shall be removed and replaced, at the Contractor's expense with concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.
- C. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.1 MPa or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 3.4 MPa will be paid for at a percentage of the contract price per cubic meter for concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.

- D. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 2.1 MPa when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

Percentage Pay Table

Modulus of Rupture (MPa) at opening to traffic	7-Day Modulus of Rupture (MPa)		
	Greater than or equal to 4.2	Less than 4.2 and greater than or equal to 3.8	Less than 3.8 and greater than or equal to 3.4
Greater than or equal to 2.8	100%	95%	90%
Less than 2.8 and greater than or equal to 2.4	95%	95%	90%
Less than 2.4 and greater than or equal to 2.1	80%*	80%*	80%*

*Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

Where pavement nominal thickness is 255 mm or greater, payment for concrete pavement (Rapid Strength Concrete) will be adjusted for low modulus of rupture tests as follows:

- A. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.3 MPa or greater before the lane is opened to the traffic and 7-day modulus of rupture of 4.2 MPa or greater will be paid for at the contract price per cubic meter for concrete pavement (Rapid Strength Concrete).
- B. Concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 3.4 MPa will not be paid for, and shall be removed and replaced, at the Contractor's expense with concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.
- C. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of 1.8 MPa or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 3.4 MPa will be paid for at a percentage of the contract price per cubic meter for concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.
- D. Concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 1.8 MPa when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

Percentage Pay Table

Modulus of Rupture (MPa) at opening to traffic	7-Day Modulus of Rupture (MPa)		
	Greater than or equal to 4.2	Less than 4.2 and greater than or equal to 3.8	Less than 3.8 and greater than or equal to 3.4
Greater than or equal to 2.3	100%	95%	90%
Less than 2.3 and greater than or equal to 2.0	95%	95%	90%
Less than 2.0 and greater than or equal to 1.8	80%*	80%*	80%*

*Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

The Contractor shall pay to the State adjustments in payment for low modulus of rupture tests in conformance with the requirements specified in the tables in this section. The Department will deduct the amount of the adjustments from moneys due or that may become due, the Contractor under the contract.

Proportioning

Weighing, measuring and metering devices used for proportioning materials shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and these special provisions.

Over and under dials, and other indicators for weighing and measuring systems used in proportioning materials shall be grouped so that the smallest increment for each indicator can be accurately read from the point at which the proportioning operation is controlled for ingredients batched at a central batch plant. In addition, indicators for weighing and measuring cement batched from a remote weighing system shall also be placed so that each indicator can be accurately read from the point at which the proportioning operation is controlled.

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates," of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures," of the Standard Specifications. Mineral admixtures shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures to easily track the materials that are entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

Weighing equipment shall be insulated against vibration or movement of other operating equipment. When the plant is in operation, the mass of each draft of material shall not vary from the designated mass by more than the tolerances specified herein. Each scale graduation shall be 0.001 of the usable scale capacity.

Aggregate shall be weighed cumulatively and equipment for the weighing of aggregate shall have a zero tolerance of ± 0.5 percent of the designated total batch mass of the aggregate. Equipment for the separate weighing of the cement or mineral admixture shall have a zero tolerance of ± 0.5 percent of their designated individual batch drafts. Equipment for measuring water shall have a zero tolerance of ± 0.5 percent of its designated mass or volume.

The mass indicated for any individual batch of material shall not vary from the preselected scale setting by more than the following:

Material	Tolerance
Aggregate	± 1.0 percent of designated batch mass
Cement	± 0.5 percent of designated batch mass
Mineral Admixture	± 1.0 percent of designated batch mass
Water	± 1.5 percent of designated batch mass or volume

Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture and water as provided in these special provisions. Dry ingredients shall be proportioned by mass. Liquid ingredients shall be proportioned by mass or volume.

At the time of batching, aggregates shall have been dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate will take place during the proportioning process. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

If separate supplies of aggregate material of the same size group with different moisture content or specific gravity or surface characteristics affecting workability are available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another supply.

Cement shall be kept separate from the aggregates until released for discharge into the mixer. Cement shall be free of lumps and clods when discharged into the mixer. Fabric containers used for transportation or proportioning of cement shall be clean and free of residue before reuse.

Weigh systems for proportioning aggregate, cement, and mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and distinct material-weighing device.

For batches with a volume of one cubic meter or more, proportioning equipment shall conform to one of the following methods:

- A. All ingredients shall be batched at a central batch plant and charged into a mixer truck for transportation to the pour site. Ingredient proportioning shall meet the requirements of Section 90-5, "Proportioning," of the Standard Specifications.
- B. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote located silo and weigh system for the proportioning of the cement. The remote system shall proportion cement for charging the mixer truck.

- C. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote location where pre-weighed, containerized cement shall be added to the mixer truck. The cement pre-weighing operation shall utilize a platform scale. The platform scale shall have a maximum capacity of 2.5 tonnes with a maximum graduation size of 0.5 kilograms. Cement shall be pre-weighed into a fabric container. The minimum amount of cement to be proportioned into any single container shall be one half of the total amount required for the load of RSC being produced.
- D. Cement, water, and aggregate shall be proportioned volumetrically in conformance with these special provisions.

In order to check the accuracy of batch masses, the gross mass and tare mass of truck mixers shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

The Contractor shall install and maintain in operating condition an electrically actuated moisture meter. The meter shall indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched. The meter shall have a sensitivity of 0.5 percent by mass of the fine aggregate.

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced. Water added to the truck mixer at the job site shall be measured through a meter that conforms to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Aggregate discharged from several bins shall be controlled by gates or by mechanical conveyors. The means of discharge from the bins and from the weigh hopper shall be interlocked so that no more than one bin can discharge at a time, and so that the weigh hopper can not be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

Weighmaster Certificates

Weighmaster certificates for RSC, regardless of the proportioning method used, shall include all information necessary to trace the manufacturer, and manufacturer's lot number for the cement being used. When proportioned into fabric containers the weighmaster certificates for the cement shall contain date of proportioning, location of proportioning and actual net draft mass of the cement. When proportioned at the pour site from a storage silo the weighmaster certificates shall contain date of proportioning, location of proportioning and the net draft mass of the cement used in the load.

Spreading, Compacting and Shaping

Metal or wood side forms may be used. Wood side forms shall not be less than 38-mm thick. Side forms shall be of sufficient rigidity, both in the form and in the connection with adjoining forms, that movement will not occur under the force from subgrading and paving equipment or from the pressure of concrete.

Side forms shall remain in place until the pavement edge no longer requires the protection of forms. Side forms shall be thoroughly cleaned and oiled prior to each use.

Consolidation of RSC shall be by means of high-frequency internal vibrators after the RSC is deposited on the subgrade. Vibrating shall be done in a manner to assure uniform consolidation adjacent to forms and across the full paving width. RSC shall be placed as nearly as possible in its final position and use of vibrators for extensive shifting of the mass of RSC will not be permitted.

RSC shall be spread and shaped by suitable powered finishing machines and supplemented by hand finishing as necessary. Methods of spreading, shaping and consolidating that result in segregation, voids or rock pockets shall be discontinued. The Contractor shall use methods that will produce dense homogeneous pavement conforming to the required cross section.

After the RSC has been mixed and placed, no additional water shall be added to the surface to facilitate finishing. Surface finishing additives, when used, shall be as recommended by the manufacturer of the cement and shall be approved by the Engineer prior to use.

Joints

Prior to placing concrete against existing concrete, a 6-mm thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse and longitudinal joint faces and extend the full depth of the excavation. The top of the joint filler shall be placed flush with the top of pavement. Joint filler shall be secured to the joint face of the existing pavement by a method that will hold the joint filler in place during the placement of concrete.

Transverse weakened plane joints in pavement widenings shall be constructed to match the spacing and skew of the weakened plane joints in the adjacent existing pavement. Where the existing transverse weakened plane joint spacing in an adjacent lane exceeds 4.6 m, an additional transverse weakened plane joint shall be constructed midway between the existing joints. The provisions in the second and third paragraphs in Section 40-1.08B, "Weakened Plane Joints," and the third paragraph in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications shall not apply. Sawing of weakened plane joints shall be completed within 2 hours of completion of final finishing. Minimum depth of cut for weakened plane joints shall be 70 mm.

Tie Bars

Tie bars shall be installed at longitudinal joints where existing tie bars were sawn through. Locations of new tie bars shall be placed as directed by the Engineer.

Tie bars shall be deformed reinforcing steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 300 or 420 and shall be epoxy-coated in conformance with the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that references made to ASTM Designation: D 3963/D 3963M shall be deemed to mean ASTM Designation: A 934/A 934M or A 775/A 775M. Tie bars shall not be bent.

Tie bars shall not be used at joints where RSC and asphalt concrete pavements join.

Tie bars shall be installed at longitudinal joints by drilling and bonding with epoxy. Epoxy shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (None-Sagging). The class used shall be dependent on the internal temperature of the existing hardened concrete at the time of tie bar installation as follows: Class A for below 4.5°C, Class B for 4.5°C to 15.5°C, and Class C for above 15.5°C. Epoxy shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Drilled holes shall be cleaned in conformance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during curing and shall remain undisturbed until epoxy has cured a minimum time as specified by the manufacturer. Tie bars that are improperly bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled adjacent to the rejected holes, as directed by the Engineer, and new tie bars shall be placed and securely bonded to the concrete. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.

Dowels

Dowels shall conform to "Concrete Pavement (with doweled transverse Weaken Plane_Joints)" of these special provisions.

Tests to determine coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any tests to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after concrete placement. Pavement areas having a coefficient of friction as determined in conformance with the requirements in California Test 342 of less than 0.30 shall be grooved in conformance with the provisions in Section 42-1.02, "Construction," of the Standard Specifications. Grooving shall be performed prior to the installation of any required edge drains adjacent to the areas to be grooved.

Transverse straightedge and longitudinal straightedge requirements will not apply to the pavement surface within 300 mm of the existing concrete pavement except as required in these special provisions. Longitudinal straightedge requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications, shall be applied at transverse contact joints with existing concrete pavement where the straightedge is to be placed with the midpoint coincident with the joints. Pavement not meeting this straightedge requirement shall be corrected within 48 hours by grinding or other methods as approved by the Engineer.

Profiles of the completed pavement surface specified in Section 40-1.10, "Final Finishing," of the Standard Specifications will be required. The Profile Index requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications shall apply.

Curing Method

The curing method for pavement shall be as recommended by the manufacturer of the cement and as approved by the Engineer.

MEASUREMENT AND PAYMENT

Concrete pavement (Rapid Strength Concrete) will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," and 40-1.14, "Payment," of the Standard Specifications, and and Concrete Pavement of these special provisions.

Concrete pavement (Rapid Strength Concrete) payments will be subject to the pay factor values listed in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions.

Full compensation for the pre-operation conference, including furnishing the facility to hold the pre-operation conference in, shall be considered as included in the contract price paid for the concrete pavement (Rapid Strength Concrete) and no additional compensation will be made therefor.

Costs for providing JITT will be made in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications, except no markups shall be added, and the Contractor will be paid for one half of the JITT cost. Costs for providing JITT shall include training materials, class site, and the JITT instructor including the JITT instructor's travel, lodging, meals and presentation materials. All costs incurred by the Contractor or Engineer for attending JITT shall be borne by the party incurring the costs.

10-1.54A TIEBACK ANCHORS

Anchors at the retaining wall No. 374L, consisting of holes drilled in foundation material, grouted steel bars or strands, and anchorage assemblies, and testing of installed anchors, shall conform to the details shown on the plans, the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Difficult tieback installation is anticipated due to the presence of caving soils, ground water, cobbles and boulders, the requirements of tieback embedment into rock, sound control, vibration monitoring and traffic control.

The Contractor shall determine the bond length necessary to meet acceptance criteria specified herein.

The submittal of reduced prints of corrected original tracings will not be required for tieback anchor installations.

In fabricating, handling, shipping, and placing tieback anchors, adequate care shall be taken to avoid damage to the sheathing. All damage to the sheathing caused by handling and fabrication prior to tieback anchor installation shall be repaired or replaced as determined by the Engineer. Repair procedure for the sheathing shall be included in the working drawings.

MATERIALS

Whenever "member" is referred to in Section 50, "Prestressing Concrete," of the Standard Specifications, it shall be considered to mean tieback anchor.

Structural steel for the tieback retaining wall shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Structural steel shall consist of the anchorage assembly. The anchorage assembly shall be galvanized as indicated on the plans. The provisions of "Welding Quality Control" of these special provisions shall not apply to the weld between the steel tube and the bearing plate of the anchorage assembly for tiebacks. Those provisions shall apply to all other welds of structural steel for tieback retaining walls.

The permanent bearing plate of the tieback anchor shall effectively distribute the design force (T), to the concrete, such that the concrete bearing stress does not exceed 11 MPa and the bending stress does not exceed $0.55 f_y$ for steel nor $0.36 f_y$ for cast steel or cast iron.

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Fine aggregate may be added to the grout mixture of portland cement and water used outside of the grouted sheathing in drilled holes which are 200 mm or greater in diameter, but only to the extent that the cement content of the grout is not less than 500 kg per cubic meter of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications.

The plastic sheathing for tieback anchors shall conform to the following: polyvinyl chloride (PVC) sheathing, high density polyethylene (HDPE) sheathing, and polypropylene sheathing.

Corrugated plastic sheathing shall be PVC or HDPE. The width of corrugations, the distance between corrugations, and the height of corrugations of corrugated plastic sheathing shall be approximately the same.

PVC sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. PVC sheathing shall conform to ASTM Designation: D 1784, Class 13464-B. Corrugated PVC sheathing shall have a nominal wall thickness of 1.0 mm. HDPE sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. HDPE sheathing shall have a density between 940 kg/m^3 and 960 kg/m^3 as measured in accordance with ASTM Designation: D 792, A-2. Corrugated HDPE sheathing shall have a nominal wall thickness of 1.5 mm for sheathing with an outside diameter of 75 mm or greater, and a nominal thickness of 1.0 mm for sheathing with an outside diameter less than 75 mm, with a tolerance of minus 0.25-mm.

HDPE sheathing may be used for the smooth sheathing encapsulating individual strands of strand type tendons. Smooth HDPE sheathing for encapsulating strands shall have a minimum wall thickness of 1.0 mm. Polypropylene sheathing may be used for the smooth plastic sheathing encapsulating individual strands of strand type tendons. Polypropylene sheathing shall have a density between 900 kg/m^3 and 910 kg/m^3 . Smooth polypropylene sheathing shall have a minimum wall thickness of 1.0 mm.

The smooth sheathing for the unbonded length of the individual strands shall have sufficient strength to prevent damage during construction operations, shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease. Smooth plastic sheathing, including joints, shall be watertight.

The corrugated sheathing, including joints, shall have sufficient strength to prevent damage during construction operations, shall be grout-tight and watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Additional requirements for tiebacks with strand type tendons are as follows:

- A. The individual strands of a tendon, except for the bonded length, shall be fully coated with corrosion inhibiting grease and then encapsulated by a smooth HDPE or polypropylene sheath. The corrosion inhibiting grease shall fill all space between strand wires and shall encapsulate the strand giving an encasement diameter at least 0.12-mm greater than the diameter of the bare strand. The sheath shall be hot melt extruded onto the strand or shall be shop applied by an approved method that assures that all spaces between the sheath and the strand and between the strand wires are filled with corrosion inhibiting grease.
- B. The corrosion inhibiting grease shall provide a continuous nonbrittle film of corrosion protection to the prestressing steel and lubrication between the strand and the sheathing, shall resist flow from the sheathing, shall be chemically stable and nonreactive with the prestressing steel, sheathing material and concrete, and shall be organic with appropriate polar, moisture displacing, and corrosion inhibiting additives.
- C. The corrosion inhibiting grease shall have the physical properties listed in Table 3.2.1 of the Post Tensioning Manual, Fourth Edition, by the Post Tensioning Institute and as modified below. At least 40 days before use, a sample from the lot to be used and test results shall be provided for the corrosion inhibiting grease.

Test	Requirements	ASTM Designation:
Water Soluble Ions: Nitrates	10 g/kg max.	D 3867
Corrosion Test: 5% Salt Fog @ 38° C. 125 µm coating on 76 mm x 152 mm Q panel Type S, 1000 hrs min.	Grade 7 or better	B 117, D 610
Compatibility with sheathing: Hardness change & volume change of polymer after exposure to grease 40 days at 66° C.	15% max. 10% max.	D 4289, Except use D 792 for density

CONSTRUCTION

Tieback anchors shall be installed in accordance with the manufacturer's recommendations. In case of a conflict between the manufacturer's recommendations and these special provisions, these special provisions shall prevail.

Water and grout from tieback anchor construction operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into landscaping, gutters or other drainage facilities. Excessive amounts of water shall not be used in any of the drilling and the tieback anchor installation procedures.

Tieback anchor steel shall be protected prior to completion of all grouting against rust, corrosion and physical damage in conformance with the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications. In addition, there shall be no evidence of distress in the plastic sheathing or crushing of the cement grout within the pregrouted sheathing.

The tieback anchorage assembly shall be protected against rust, corrosion and physical damage, prior to completion of all grouting of enclosure or encasement in concrete.

The tieback anchor installation method selected by the Contractor shall be sufficient to achieve the loadings specified herein. Holes for tieback anchors shall be drilled in the foundation to a depth sufficient to provide the necessary bond length beyond the minimum unbonded length shown on the plans.

Tieback anchorage holes shall be drilled by either the rotary or rotary percussion drilling method.

The diameter of the drilled hole shall be large enough to provide a minimum of 25 mm grout cover within the bonded length of the tendon. Centralizers shall be used within the bonded length of the tendon.

Pregrouting shall occur at least 48 hours before placing the tendon in the drilled hole.

Prior to installing each anchor assembly into the drilled hole, the anchor assembly shall be clean and free of oil, grease or other extraneous substances, and any damage to the sheathing shall be repaired or replaced.

Grout for all stages of tieback construction shall be injected at the low end of the void being filled and shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout. The grout shall be placed using grout tubes, unless another method is approved by the Engineer. The quantity of the grout and the grout pressures shall be recorded.

Voids in the foundation material may be encountered along the length of the drilled hole which may effect drilling and grouting. Measures such as the use of a "grout sock" may be necessary to avoid the excessive loss of grout into the voids encountered.

After placing initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with bar type tendons are as follows:

- A. The bar tendons in the unbonded area shall be sheathed with smooth sheathing that extends into the steel tube of the permanent tieback anchorage assembly, as shown on the plans. For this portion of smooth sheathing there is no minimum wall thickness and the sheathing shall be either PVC or HDPE.
- B. In addition, bar tendons shall be sheathed full-length with corrugated sheathing. The annular space between the bar and the corrugated sheathing shall be pregouted prior to placing the tendons in the drilled hole. The bar shall be centered in the sheathing.
- C. There shall be a seal between the smooth sheathing and the corrugated sheathing at the top and bottom of the length of smooth sheathing.
- D. For bar tendons, the initial grout in the drilled hole may be placed before or after insertion of the bar tendon.
- E. For drilled holes 150 mm in diameter or less, the initial grout outside of the corrugated sheathing shall extend to within 150 mm of the end of the steel tube of the anchorage assembly. Grout in the unbonded length shall not be placed under pressure. For drilled holes greater than 150 mm in diameter, the initial grout outside of the corrugated sheathing shall be within the limits of the bonded length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with strand type tendons are as follows:

- A. The Contractor shall have the option of using Alternative A or Alternative B as shown on the plans for tieback tendons.
- B. For Alternative A and Alternative B, strand tendons shall be sheathed with corrugated sheathing. The individual strands within the bonded length shall be separated by spaces so that the entire surface of each strand is bonded in the grout. The maximum spacing of strand spacers shall be 1.50 m. The strand spacers shall be plastic and of a construction and strength that will provide support for the individual strands during construction operations.
- C. For Alternative A, the bonded length of the tendon is sheathed with corrugated sheathing and pregouted full length of the corrugated sheathing before placing the tendon in the hole. The corrugated sheathing shall lap the smooth sheathing on the strands 600 mm. For this alternative, the initial grout in the drilled hole may be placed before or after insertion of the strand tendon.
- D. For Alternative B, the tendon is sheathed full length with corrugated sheathing and pregouted a minimum length of 600 mm before placing the tendon in the hole. After placing the tendon into the drilled hole and before placing initial grout in the drilled hole, the grout shall be injected at the low end of the corrugated sheathing and the grout shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout.
- E. For Alternative A and Alternative B, anchors in holes of 150 mm diameter and smaller shall be initially grouted to within 150 mm of the end of the steel tube. Grout in the unbonded length shall not be placed under pressure. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.
- F. For Alternative A and Alternative B, anchors in holes of greater than 150 mm diameter shall be initially grouted within the bond length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Testing

All tiebacks shall be load tested by either a performance test or a proof test. Load testing shall be performed against the permanent concrete waler. The permanent waler shall either attain a compressive strength of 22 MPa or cure for 7 days before loading. Bearing pads shall be kept a minimum of 300 mm away from the edges of the drilled hole. The magnitude of applied test loads shall be determined with a calibrated pressure gauge or a load cell. Movements of the end of the tieback, relative to an independent fixed reference point, shall be measured and recorded to the nearest 0.025 mm at each load increment during the load tests. The Contractor shall perform the measuring and recording and shall furnish the Engineer copies of the recorded movements.

A minimum of 17 tiebacks shall be performance tested. The Engineer shall determine the location of the tiebacks to be performance tested.

The performance test or proof test shall be conducted by measuring the test load applied to the tieback and the tieback end movement during incremental loading and unloading of the anchor in accordance with the loading schedule. The test load shall be held constant for 10 minutes. During the test load hold, the movement of the end of the tendon shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between one minute and 10 minutes exceeds one mm, the test load shall be held for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the test load is held for 60 minutes, a creep curve showing the creep movement between one minute and 60 minutes shall be plotted as a function of the logarithm of time.

LOADING SCHEDULES		
PERFORMANCE TEST	PROOF TEST	
	(CONT'D)	
AL	AL	AL
0.25T	0.25T	0.25T
AL	0.50T	0.50T
0.25T	0.75T	0.75T
0.50T	1.00T	1.00T
AL	1.25T	1.25T
0.25T	AL	1.50T (TEST LOAD)
0.50T	0.25T	AL
0.75T	0.50T	
AL	0.75T	
0.25T	1.00T	
0.50T	1.25T	
0.75T	1.50T (TEST LOAD)	
1.00T (CONT'D)	AL	
T = Design force for the anchor shown on the plans		
AL = Alignment load		

For performance and proof tests, each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes or as specified above. The observation period for the load hold shall start when the pump begins to apply the last increment of load.

The jacking equipment, including the tendon movement measuring system, shall be stable during all phases of the tieback loading operations.

All tiebacks not performance tested shall be proof tested. If 1.5 times the design force cannot be obtained, the tieback shall be redesigned and replaced. Tieback anchors shall not be retested, unless the tieback bond length is post-grouted after the unacceptable test.

A performance tested tieback is acceptable if:

- A. The measured elastic movement exceeds 0.80 of the theoretical elongation of the unbonded length plus the jacking length at the maximum test load; and
- B. The creep movement between one and 10 minutes is less than 1.0 mm.

A proof tested tieback is acceptable if:

- A. The pattern of movements is similar to that of adjacent performance tested tiebacks; and
- B. The creep movement between one and 10 minutes is less than 1.0 mm.

Performance tested or proof tested tiebacks which fail to meet acceptance criterion B will be acceptable if the maximum load is held for 60 minutes and the creep curve plotted from the movement data indicates a creep rate of less than 2.0 mm for the last log cycle of time.

Lock-off

After successful testing of the tiebacks, the tiebacks shall be tensioned against the structure and locked off at a load equal to 0.8 T. The lock-off force is the load on the jacks which is maintained while the anchor head or anchor nuts on the tieback are permanently set. Immediately after lock-off, a lift-off test shall be performed to demonstrate that the specified lock-off force was obtained. Adjustments in the shim thickness shall be made if required to maintain the specified lock-off force.

For strand tendons, the permanent wedges shall be fully set in the anchor head while the tendon is stressed to the test load of 1.50 T, and then locked off at the lock-off force by removal of the shims or other appropriate means.

Grouting to the level of secondary grouting to the dimensions shown on the plans shall be completed only after successful testing and lock-off has been completed. At least 24 hours after the secondary grout has set, the remaining void in the steel tube and bearing plate shall be filled with grout. Grout shall be injected at the low end and expelled at the high end until there is no evidence of entrapped air or water. A minimum grout head of 600 mm shall be maintained until the grout has set.

MEASUREMENT AND PAYMENT

No payment will be made for tiebacks which do not pass the specified testing requirements.

Tieback anchors will be measured and paid for by the unit, and the number for payment will be determined by the requirements of the details shown on the plans. The contract unit price paid for tieback anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the tieback anchors, including special measures taken to contain grout in the drilled hole, testing, and furnishing and installing anchorage assemblies, complete in place, including repair or replacement of sheathing as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.62 ARCHITECTURAL SURFACE (TEXTURED CONCRETE)

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Architectural textures listed below are required at concrete surfaces shown on the plans:

- A. Architectural surface (barrier)
- B. Swirled plaster texture
- C. Cobblestone texture
- D. Barrier tile texture

The architectural surface (barrier) and the swirled plaster texture shall simulate a formed relief constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the architectural texture.

COBBLESTONE TEXTURE

Cobblestone texture shall be an architectural texture simulating the appearance of cobblestone and shall conform to the referee sample.

REFEREE SAMPLE

The Cobblestone texture shall match the texture, color and pattern (except for cobble size) of the referee sample located at the Office of the Caltrans District 11 Construction Duty Senior available for inspection by bidders 2829 Juan Street, San Diego, California.

TEST PANEL

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer. Except the formed relief texture with sand blast finish shall not be colored.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (MPa)	D 412	0.9 to 6.2
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (MPa)	D 2370	18 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

COBBLESTONE TEXTURE SURFACING FINISH

The cobblestone finish shall receive a Class 1 finish followed by a light abrasive blasting using fine abrasive to remove any surface sheen, loose material, laitance, efflorescence and other material.

Cobblestone texture shall be stained. The Contractor's attention is directed to "Prepare and Stain Concrete" of these special provisions. The cobblestones shall be randomly stained light brown and gray in colors to match the referee sample.

ABRASIVE BLASTING

The architectural texture, except for architectural surface (barrier), shall be abrasive blasted with fine abrasive to remove the sheen without exposing coarse aggregate.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Architectural texture will be measured and paid for by the square meter.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for architectural texture on precast concrete panels for mechanically stabilized embankment shall be considered as included in the contract price paid per square meter for earth retaining structure involved and no separate payment will be allowed therefor.

10-1.62A PREPARE AND STAIN CONCRETE

This work shall consist of preparing and staining concrete surfaces where shown on the plans to be stained or which are designated to be stained in these special provisions.

After completion of the class of concrete surface finish required in Section 51, "Concrete Structures," of the Standard Specifications, the surfaces of the concrete to be stained shall be prepared by a light water blasting of the surface as necessary to remove any remaining form oil or other contaminants. The concrete surface shall be thoroughly dry at the time stain is applied.

The stain shall be of a water based, styrene-acrylic coating which has been commercially manufactured for use as an exterior concrete stain. The stain shall be formulated and applied so that the color of the stained concrete closely conforms to referee sample mentioned under "Architectural Surface (Textured Concrete)" elsewhere in these special provisions.

Each coat shall be thoroughly cured before the succeeding coat is applied. Areas not to be stained shall be protected so that they remain stain-free.

Preparing and staining concrete will be measured by the square meter. Measurement will be made along the surface of the actual areas stained.

The contract price paid per square meter for prepare and stain concrete shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in preparing surfaces and applying stain to concrete surfaces, as shown on the plans, as specified in these specifications, and as directed by the Engineer.

10-1.62B ANTI-GRAFFITI PROTECTIVE COATING

Anti-graffiti protective coating for use on surfaces receiving stained cobblestone texture shall conform to Section 7, "Legal Relations and Responsibilities," of the Standard Specifications and these special provisions.

All surfaces to be treated shall have cured a minimum of 28 days, and shall be clean and dry prior to applying the protective coating. The protective coating shall be sprayed in accordance with the manufacturer's instructions.

The anti-graffiti protective coating shall be a clear, non-flammable, vegetable based polymer, sacrificial type, easily washed with hot water, used to prevent graffiti from penetrating the surface of concrete materials.

Anti-graffiti protective coating shall be applied in a minimum of 3 even coats on all surfaces to be treated. Each coat must be thoroughly dried before applying next coat.

The contract unit price paid per square meter for anti-graffiti protective coating shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in anti-graffiti protective coating, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.64A SHOTCRETE

Shotcrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 53, "Shotcrete," of the Standard Specifications and these special provisions.

Shotcrete operations shall completely encase all reinforcement and other obstructions shown on the plans. Exceptional care shall be taken to properly encase the reinforcement and other obstructions with shotcrete.

Attention is directed to the section, "Order of Work," in these special provisions regarding furnishing preconstruction shotcrete test panels.

Except for finish coats, shotcrete shall be applied by the wet-mix process only.

Finish coats, applied by the dry-mix process, may be used only when approved by the Engineer.

Shotcrete shall have a minimum compressive strength of 22.5 MPa at 28 days or as shown on the plans, whichever is greater. No shotcrete work shall be performed prior to verification by the Engineer of the required compressive strength.

Bar reinforcing steel shall conform to the requirements in "Reinforcement" of these special provisions.

Splicing of reinforcing bars No. 22 or larger in shotcrete shall be by butt splicing only.

The Contractor shall be responsible for obtaining and testing all required preconstruction and production test cores. All coring and testing shall be at the Contractor's expense and performed in the presence of the Engineer, unless otherwise directed. The Engineer shall be notified a minimum of 24 hours prior to the Contractor performing any coring or testing operations.

All cores shall be obtained and tested for compressive strength in conformance with the requirements in ASTM Designation: C 42. Cores used for determining compressive strength shall not contain any bar reinforcement or other obstructions. The testing shall be performed at an independent testing facility approved by the Engineer. A copy of the test results shall be furnished to the Engineer within 5 days following completion of testing.

All test panels shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PRECONSTRUCTION REQUIREMENTS

Prior to performing shotcrete work, the Contractor shall construct at least 2 preconstruction shotcrete test panels for each mixture being considered unless otherwise specified.

The nozzleperson shall have a minimum of 3000 hours experience as a nozzleperson on projects with a similar application.

At least 10 working days prior to constructing any shotcrete test panels, the Contractor shall submit to the Engineer for approval, a Quality Control Plan (QCP) for the proposed method of shotcrete placement. The plan shall include the following:

- A. The number and qualifications of nozzlepersons available to place shotcrete, the number of nozzlepersons on-site at any time during the shotcrete placement, description of their work schedule, and the procedures for avoiding fatigue of any nozzleperson.
- B. The proposed method of placing shotcrete, including, but not limited to, application rates, details of any proposed construction joints and their locations, and methods for achieving the required thickness and surface finish.
- C. The procedure for curing shotcrete surfaces.
- D. The description of a debris containment system, to be used during the cleaning of bar reinforcing steel and concrete and placing of shotcrete, as required to provide for public safety.

The Engineer shall have 10 working days to review and approve the QCP submittal after a complete plan has been received. No construction of shotcrete test panels shall be performed until the QCP is approved by the Engineer. Should the Engineer fail to complete the review within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in approving the QCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Preconstruction shotcrete test panels shall be constructed by the nozzlepersons and application crew scheduled to do the work, using equipment, materials, mixing proportions, ambient temperatures and procedures proposed for the work. The preconstruction shotcrete test panels shall conform to the following:

- A. One shotcrete test panel, of the size determined by the Contractor, shall be unreinforced and shall have 3 cores taken from it and tested for compressive strength. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. The test panel shall be identified and submitted to the Engineer with the test results including a description of the mixture, proportions, and ambient temperature.
- B. One shotcrete test panel shall have the same (1) thickness, (2) bar size and amount of bar reinforcement or other obstructions and (3) positioning of bar reinforcement or obstructions as the most heavily reinforced section of shotcrete to be placed. The test panel shall be square with the length of the sides equal to at least 3 times the thickness of the most heavily reinforced section of shotcrete to be placed, but not less than 750 mm. After a minimum 7 days of cure, the test panel shall be broken by the Contractor, in the presence of the Engineer, into pieces no larger than 250 mm in greatest dimension. The surfaces of the broken pieces shall be dense and free of laminations and sand pockets, and shall verify that the bar reinforcement or other obstructions are completely encased.
- C. Both test panels shall be cured under conditions similar to the actual work.
- D. At the option of the Contractor, cores to be used for determining the compressive strength may be taken from the reinforced test panel described above in lieu of making a separate unreinforced test panel as described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring or contains bar reinforcement or other obstructions, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. If cores are taken from the reinforced test panel, the panel shall not be broken into pieces, as described above, until it has cured for a minimum of 14 days.

The requirements for constructing preconstruction shotcrete test panels may be eliminated, when approved by the Engineer, if a test panel report and certified compressive strength test data are furnished from a State highway project with a similar application of approximately equal thickness, including similar amounts and placement of reinforcement or other obstructions. The nozzle person, proposed to be used, shall have constructed the test panel described in the test panel report. The test panel report shall list the names of the application crew, equipment used, materials, mixing proportions, ambient temperatures and procedures used to make the test panels. The certified compressive strength test data shall be for cores taken from the same test panels.

PLACING

An air blowpipe shall be used during shotcrete placement to remove rebound, overspray and other debris from the areas to receive shotcrete.

Construction joints shall be tapered, and shall conform to the provisions in Sections 51-1.13, "Bonding," of the Standard Specifications.

All overspray and rebound shall be removed prior to final set and before placement of shotcrete on adjacent surfaces.

Rebound or any other material which has already exited the nozzle shall not be reused.

Shotcrete shall be cured in conformance with the provisions of Section 90-7.03, "Curing Structures," of the Standard Specifications.

When a finish coat is to be used, all loose, uneven or excess material, glaze, and rebound shall be removed by brooming, scraping, or other means and the surface left scarified. Any surface deposits which take a final set shall be removed by abrasive blasting. Prior to placing the finish coat, the receiving surface shall be washed down with an air-water blast.

Shotcrete extending into the space shown on the plans for cast-in-place concrete shall be removed.

TESTING AND ACCEPTANCE

At least 3 production shotcrete test cores shall be taken from each 30 square meters or portion thereof of shotcrete placed each day. The cores shall be 76 mm in diameter. The location where cores are to be taken will be designated by the Engineer. Test cores shall be identified by the Contractor and a description of the core location and mixture, including proportions, shall be submitted to the Engineer with the test cores, immediately after coring. Cored holes shall be filled with mortar in conformance with the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Upon receipt of the cores, the Engineer will perform a visual examination to determine acceptance, as described below. Within 48 hours after receipt, the Engineer will return the cores to the Contractor for compressive strength testing.

The compressive strength test shall be performed using the shotcrete production test cores described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores.

The basis of acceptance for production shotcrete test cores shall be (1) that the core is dense and free of laminations and sand pockets, and shows that the reinforcement or other obstructions are completely encased and (2) the same as specified for test cylinders in the fourth and fifth paragraphs of Section 90-9.01, "General," of the Standard Specifications.

If any production test core shows signs of defective shotcrete as described in (1) above, the shotcrete represented by such test core will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the shotcrete placed in the work are acceptable.

The surface finish of the shotcrete shall conform to the provisions of Section 51-1.18, "Surface Finishes," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Reinforcement shall be measured and paid for separately as bar reinforcing steel.

Full compensation for the Quality Control Plan, constructing and breaking test panels, furnishing and testing cores and patching cored holes shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.82A MINOR CONCRETE CHANNEL

The concrete channel behind the soil nail and tieback retaining wall shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," and Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Minor concrete channel (Type A) will be measured and paid for by the meter.

The contract price paid per meter for minor concrete channel (Type A) shall include full compensation for furnishing all labor, materials (including welded wire fabric), tools, equipment, and incidentals, and for doing all the work involved in constructing the channel, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.82B MINOR CONCRETE (GUTTER)

The gutter located behind the earth retaining structure shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Minor concrete (gutter) will be measured and paid for by the meter.

The contract price paid per meter for minor concrete (gutter) shall include full compensation for furnishing all labor, materials (including grates at vertical drains), tools, equipment, and incidentals, and for doing all the work involved in constructing the gutter, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer

ENGINEER'S ESTIMATE

11-080914

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
1	070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM	LUMP SUM	
2	070018	TIME-RELATED OVERHEAD	WDAY	740		
3 (S)	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM	LUMP SUM	
4 (S)	032139	TEMPORARY EROSION CONTROL (TYPE 1)	M2	119 000		
5 (S)	032140	TEMPORARY EROSION CONTROL (TYPE 2)	M2	9660		
6 (S)	074037	MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)	EA	10		
7 (S)	074032	TEMPORARY CONCRETE WASHOUT FACILITY	EA	38		
8 (S)	032141	TEMPORARY CONSTRUCTION ENTRANCE (TYPE 2)	EA	14		
9 (S)	032142	SWEEPER	EA	1		
10 (S)	032143	TEMPORARY GRAVEL BAG	EA	2740		
11 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM	LUMP SUM	
12 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	
13 (S)	120120	TYPE III BARRICADE	EA	5		
14 (S)	120151	TEMPORARY TRAFFIC STRIPE (TAPE)	M	42 260		
15 (S)	120152	TEMPORARY PAVEMENT MARKING (TAPE)	M2	130		
16 (S)	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	M	1110		
17 (S)	120300	TEMPORARY PAVEMENT MARKER	EA	10 100		
18 (S)	128201	TEMPORARY DELINEATOR (CLASS 1)	EA	100		
19 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	10		
20 (S)	129000	TEMPORARY RAILING (TYPE K)	M	32 300		

ENGINEER'S ESTIMATE

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
21 (S)	032144	TEMPORARY RAILING (TYPE K) STAKED	M	30		
22 (S)	032145	TRAFFIC PLASTIC DRUMS	EA	710		
23 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	550		
24 (S)	032146	TEMPORARY CRASH CUSHION (TYPE ADIEM)	EA	9		
25	032147	ABANDON IRRIGATION CROSS OVER	EA	30		
26	150608	REMOVE CHAIN LINK FENCE	M	100		
27	150662	REMOVE METAL BEAM GUARD RAILING	M	1090		
28 (S)	032148	REMOVE THRIE BEAM BARRIER	M	5130		
29 (S)	150710	REMOVE TRAFFIC STRIPE	M	37 000		
30 (S)	150713	REMOVE PAVEMENT MARKING	M2	60		
31 (S)	032149	REMOVE TRAFFIC STRIPE (YELLOW)	M	640		
32	BLANK					
33	150742	REMOVE ROADSIDE SIGN	EA	10		
34	150760	REMOVE SIGN STRUCTURE	EA	5		
35	150805	REMOVE CULVERT	M	270		
36	150820	REMOVE INLET	EA	9		
37	150823	REMOVE DOWNDRAIN	EA	1		
38	150844	REMOVE SLOPE PAVING	M3	150		
39	150857	REMOVE ASPHALT CONCRETE SURFACING	M2	2800		
40	151272	SALVAGE METAL BEAM GUARD RAILING	M	100		

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41	151572	RECONSTRUCT METAL BEAM GUARD RAILING	M	440		
42	152320	RESET ROADSIDE SIGN	EA	30		
43	152390	RELOCATE ROADSIDE SIGN	EA	5		
44	152394	RELOCATE SIGN STRUCTURE	EA	3		
45	152604	MODIFY INLET	EA	7		
46 (S)	153154	COLD PLANE ASPHALT CONCRETE PAVEMENT (60 MM MAXIMUM)	M2	1000		
47	153214	REMOVE CONCRETE CURB	M	300		
48	153221	REMOVE CONCRETE BARRIER	M	1000		
49	153225	PREPARE CONCRETE BRIDGE DECK SURFACE	M2	4490		
50	153229	REMOVE CONCRETE BARRIER (TYPE K)	M	3000		
51	153235	CLEAN BRIDGE DECK	M2	1210		
52	155003	CAP INLET	EA	11		
53	155006	CAP RISER	EA	13		
54	156576	REMOVE METAL RAILING	M	100		
55	157551	BRIDGE REMOVAL, LOCATION A	LS	LUMP SUM	LUMP SUM	
56	157562	BRIDGE REMOVAL (PORTION), LOCATION B	LS	LUMP SUM	LUMP SUM	
57	157563	BRIDGE REMOVAL (PORTION), LOCATION C	LS	LUMP SUM	LUMP SUM	
58	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	
59	170101	DEVELOP WATER SUPPLY	LS	LUMP SUM	LUMP SUM	
60	190101	ROADWAY EXCAVATION	M3	380 000		

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM	LUMP SUM	
62 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	5907		
63 (F)	192020	STRUCTURE EXCAVATION (TYPE D)	M3	3325		
64 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	10 690		
65 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	8215		
66 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	13 889		
67 (F)	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	M3	784		
68	193114	SAND BACKFILL	M3	100		
69 (F)	193119	LEAN CONCRETE BACKFILL	M3	370		
70	194001	DITCH EXCAVATION	M3	60		
71 (F)	197026	EARTH RETAINING STRUCTURE, LOCATION 1	M2	174		
72 (F)	197027	EARTH RETAINING STRUCTURE, LOCATION 2	M2	62		
73 (F)	197028	EARTH RETAINING STRUCTURE, LOCATION 3	M2	280		
74 (F)	197029	EARTH RETAINING STRUCTURE, LOCATION 4	M2	288		
75 (F)	049566	EARTH RETAINING STRUCTURE, LOCATION 5	M2	475		
76 (F)	049567	EARTH RETAINING STRUCTURE, LOCATION 6	M2	132		
77 (F)	049568	EARTH RETAINING STRUCTURE, LOCATION 7	M2	1100		
78 (F)	049569	EARTH RETAINING STRUCTURE, LOCATION 8	M2	108		
79 (S)	200001	HIGHWAY PLANTING	LS	LUMP SUM	LUMP SUM	
80 (S)	200101	IMPORTED TOPSOIL	M3	5150		

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
81 (S)	032150	ROCK MULCH	M2	570		
82 (S)	032151	DECOMPOSED GRANITE	M3	50		
83 (S)	203003	STRAW (EROSION CONTROL)	TONN	30		
84 (S)	203014	FIBER (EROSION CONTROL)	KG	26 800		
85 (S)	203021	FIBER ROLLS	M	18 900		
86 (S)	203024	COMPOST (EROSION CONTROL)	KG	23 800		
87 (S)	203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	5		
88 (S)	032152	PURE LIVE SEED TYPE 1 (EROSION CONTROL)	KG	150		
89 (S)	032153	PURE LIVE SEED TYPE 2 (EROSION CONTROL)	KG	350		
90 (S)	203056	COMMERCIAL FERTILIZER (EROSION CONTROL)	KG	380		
91 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	KG	2600		
92 (S)	204030	TRANSPLANT TREE	EA	2		
93 (S)	204098	MAINTAIN EXISTING PLANTS	LS	LUMP SUM	LUMP SUM	
94 (S)	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM	LUMP SUM	
95 (S)	208000	IRRIGATION SYSTEM	LS	LUMP SUM	LUMP SUM	
96	208038	NPS 3 SUPPLY LINE (BRIDGE)	M	390		
97 (S)	208731	200 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	250		
98 (S)	208732	250 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	140		
99 (S)	208794	20 MM WELDED STEEL PIPE CONDUIT	M	10		
100 (S)	208798	200 MM WELDED STEEL PIPE CONDUIT (6.35 MM THICK)	M	100		

ENGINEER'S ESTIMATE**11-080914**

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
101 (S)	208799	250 MM WELDED STEEL PIPE CONDUIT (6.35 MM THICK)	M	150		
102 (S)	208910	EXTEND 250 MM CONDUIT	M	7		
103	260201	CLASS 2 AGGREGATE BASE	M3	64 300		
104	374002	ASPHALTIC EMULSION (FOG SEAL COAT)	TONN	13		
105	390155	ASPHALT CONCRETE (TYPE A)	TONN	27 600		
106	390171	ASPHALT CONCRETE BASE (TYPE A)	TONN	45 600		
107	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	100		
108	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	360		
109	394044	PLACE ASPHALT CONCRETE DIKE (TYPE C)	M	90		
110	394046	PLACE ASPHALT CONCRETE DIKE (TYPE D)	M	3500		
111	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	M	8300		
112	394049	PLACE ASPHALT CONCRETE DIKE (TYPE F)	M	350		
113	401000	CONCRETE PAVEMENT	M3	35 900		
114	032154	CONCRETE PAVEMENT RAPID STRENGTH CONCRETE	M3	400		
115 (S)	404092	SEAL PAVEMENT JOINT	M	81 100		
116 (S)	404094	SEAL LONGITUDINAL ISOLATION JOINT	M	9500		
117	490570	FURNISH STEEL PILING (HP 360 X 174)	M	265		
118 (S)	490571	DRIVE STEEL PILE (HP 360 X 174)	EA	18		
119 (S)	490655	400 MM CAST-IN-DRILLED-HOLE CONCRETE PILING	M	34		
120 (S)	490657	600 MM CAST-IN-DRILLED-HOLE CONCRETE PILING	M	3040		

ENGINEER'S ESTIMATE**11-080914**

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
121	490700	FURNISH PILING (CLASS 900) (ALTERNATIVE W)	M	1904		
122 (S)	490701	DRIVE PILE (CLASS 900) (ALTERNATIVE W)	EA	170		
123 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	LUMP SUM	
124 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	1981		
125 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	9670		
126 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	4774		
127 (F)	510072	STRUCTURAL CONCRETE, BARRIER SLAB	M3	1173		
128 (F)	510085	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	M3	16		
129 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	M3	787		
130	510126	CLASS 2 CONCRETE (MINOR STRUCTURE)	M3	70		
131 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	340		
132 (F)	511036	ARCHITECTURAL SURFACE (BARRIER)	M2	1994		
133 (F)	049570	SWIRLED PLASTER TEXTURE	M2	7920		
134	032155	BARRIER TILE TEXTURE	M2	1444		
135	511106	DRILL AND BOND DOWEL	M	35		
136	512230	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (10 M - 15 M)	EA	4		
137	512231	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (15 M - 20 M)	EA	8		
138	512233	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (25 M - 30 M)	EA	4		
139	512234	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (30 M - 35 M)	EA	6		
140	512500	ERECT PRECAST PRESTRESSED CONCRETE GIRDER	EA	22		

ENGINEER'S ESTIMATE

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
141	515041	FURNISH POLYESTER CONCRETE OVERLAY	M3	112		
142 (F)	515042	PLACE POLYESTER CONCRETE OVERLAY	M2	4490		
143 (S-F)	515074	CORE CONCRETE (101 MM - 150 MM)	M	4		
144 (S)	519117	JOINT SEAL (MR 30 MM)	M	242		
145 (S)	519125	JOINT SEAL ASSEMBLY (MR 70 MM)	M	43		
146 (S)	519126	JOINT SEAL ASSEMBLY (MR 80 MM)	M	37		
147 (S)	519128	JOINT SEAL ASSEMBLY (MR 100 MM)	M	16		
148 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	2 040 300		
149 (S-F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	264 530		
150 (F)	520120	HEADED BAR REINFORCEMENT	EA	13 244		
151 (F)	540102	TREAT BRIDGE DECK	M2	1210		
152	540109	FURNISH BRIDGE DECK TREATMENT MATERIAL (LOW ODOR)	L	480		
153 (S-F)	049571	ISOLATION CASING	KG	9800		
154 (F)	560208	FURNISH SIGN STRUCTURE (TUBULAR)	KG	43 000		
155 (S-F)	560209	INSTALL SIGN STRUCTURE (TUBULAR)	KG	43 000		
156 (F)	560213	FURNISH SIGN STRUCTURE (LIGHTWEIGHT)	KG	4000		
157 (S-F)	560214	INSTALL SIGN STRUCTURE (LIGHTWEIGHT)	KG	4000		
158 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	8000		
159 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	8000		
160 (S)	561008	760 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	23		

ENGINEER'S ESTIMATE**11-080914**

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
161 (S)	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	10		
162 (S)	561010	1070 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	81		
163 (S)	566011	ROADSIDE SIGN - ONE POST	EA	16		
164 (S)	566012	ROADSIDE SIGN - TWO POST	EA	6		
165 (S)	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	6		
166	BLANK					
167	620913	600 MM ALTERNATIVE PIPE CULVERT	M	10		
168	620919	750 MM ALTERNATIVE PIPE CULVERT	M	10		
169	620930	1050 MM ALTERNATIVE PIPE CULVERT	M	10		
170	650069	450 MM REINFORCED CONCRETE PIPE	M	70		
171	BLANK					
172	650075	600 MM REINFORCED CONCRETE PIPE	M	5050		
173	650077	750 MM REINFORCED CONCRETE PIPE	M	2		
174	650079	900 MM REINFORCED CONCRETE PIPE	M	50		
175	650081	1050 MM REINFORCED CONCRETE PIPE	M	710		
176	664008	300 MM CORRUGATED STEEL PIPE	M	5		
177	664014	450 MM CORRUGATED STEEL PIPE (1.63 MM THICK)	M	10		
178	681066	150 MM PLASTIC PIPE	M	10		
179	690158	300 MM CORRUGATED STEEL PIPE DOWNDRAIN	M	15		
180	690167	450 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.77 MM THICK)	M	45		

ENGINEER'S ESTIMATE
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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
181	690171	600 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.77 MM THICK)	M	55		
182	703233	GRATED LINE DRAIN	M	135		
183	705224	600 MM CONCRETE FLARED END SECTION	EA	1		
184	705337	600 MM ALTERNATIVE FLARED END SECTION	EA	1		
185	705338	750 MM ALTERNATIVE FLARED END SECTION	EA	1		
186	705340	1050 MM ALTERNATIVE FLARED END SECTION	EA	1		
187	707479	900 MM REINFORCED CONCRETE PIPE RISER	M	10		
188	708064	450 MM ALTERNATIVE PIPE RISER	M	6		
189	708066	600 MM ALTERNATIVE PIPE RISER	M	40		
190	708068	900 MM ALTERNATIVE PIPE RISER	M	15		
191	721431	CONCRETE (CONCRETE APRON)	M3	10		
192 (F)	721810	SLOPE PAVING (CONCRETE)	M3	100		
193 (F)	721811	SLOPE PAVING (MASONRY BLOCK)	M2	2030		
194 (F)	049572	SLOPE PAVING (EXPOSED AGGREGATE)	M2	230		
195	727901	MINOR CONCRETE (DITCH LINING)	M3	160		
196	729010	ROCK SLOPE PROTECTION FABRIC	M2	100		
197	032156	MINOR CONCRETE (TEXTURE PAVING) (MEDIAN PAVING)	M2	490		
198	032157	MINOR CONCRETE (TEXTURE PAVING) (GORE PAVING)	M2	3900		
199	731627	MINOR CONCRETE (CURB, SIDEWALK AND CURB RAMP)	M3	110		
200 (S-F)	750001	MISCELLANEOUS IRON AND STEEL	KG	17 200		

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Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
201 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	KG	50		
202 (S-F)	750505	BRIDGE DECK DRAINAGE SYSTEM	KG	2050		
203 (S)	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	100		
204 (S)	802589	1.5 M CHAIN LINK GATE (TYPE CL-1.8)	EA	1		
205 (S)	802672	4.9 M CHAIN LINK GATE (TYPE CL-1.8)	EA	1		
206	820107	DELINEATOR (CLASS 1)	EA	170		
207 (S)	820110	MILEPOST MARKER	EA	3		
208 (S)	820118	GUARD RAILING DELINEATOR	EA	390		
209 (S)	832001	METAL BEAM GUARD RAILING	M	770		
210	833080	CONCRETE BARRIER (TYPE K)	M	730		
211 (F)	049573	TUBULAR PIPE HANDRAILING	M	60		
212 (F)	833142	CONCRETE BARRIER (TYPE 26 MODIFIED)	M	480		
213	BLANK					
214 (S)	839521	CABLE RAILING	M	1800		
215 (S)	839565	TERMINAL SYSTEM (TYPE SRT)	EA	9		
216	BLANK					
217 (S)	839605	CRASH CUSHION (REACT 9SCBS)	EA	1		
218 (S)	032158	QUADGUARD CRASH CUSHION	EA	2		
219 (F)	839702	CONCRETE BARRIER (TYPE 60A)	M	92		
220 (F)	049574	CONCRETE BARRIER (TYPE 60AR)	M	140		

ENGINEER'S ESTIMATE

11-080914

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
221	032159	CONCRETE BARRIER (TYPE 60D MOD.)	M	1160		
222 (S)	839710	CONCRETE BARRIER (TYPE 60S)	M	4720		
223 (S)	839712	CONCRETE BARRIER (TYPE 60SC)	M	1990		
224 (F)	839717	CONCRETE BARRIER (TYPE 732 MODIFIED)	M	3282		
225 (F)	049575	CONCRETE BARRIER (TYPE 732A MODIFIED)	M	317		
226 (F)	049576	CONCRETE BARRIER (TYPE 60S MODIFIED)	M	111		
227 (F)	049577	CONCRETE BARRIER (TYPE 60SE MODIFIED)	M	1110		
228 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	560		
229 (S)	840563	200 MM THERMOPLASTIC TRAFFIC STRIPE	M	3750		
230 (S)	840564	200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M)	M	2910		
231 (S)	840571	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 5.18 M - 2.14 M)	M	2475		
232 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	M	47 900		
233 (S)	840660	PAINT PAVEMENT MARKING	M2	90		
234 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	6410		
235 (S)	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	3100		
236 (S)	860251	SIGNAL AND LIGHTING (LOCATION 1)	LS	LUMP SUM	LUMP SUM	
237 (S)	860252	SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM	LUMP SUM	
238 (S)	860253	SIGNAL AND LIGHTING (LOCATION 3)	LS	LUMP SUM	LUMP SUM	
239 (S)	860254	SIGNAL AND LIGHTING (LOCATION 4)	LS	LUMP SUM	LUMP SUM	
240 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM	LUMP SUM	

ENGINEER'S ESTIMATE

11-080914

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
241 (S)	860761	LIGHTING CONDUIT (BRIDGE)	M	360		
242 (S)	860792	COMMUNICATION CONDUIT (BRIDGE)	M	360		
243 (S)	860796	SPRINKLER CONTROL CONDUIT (BRIDGE)	M	360		
244 (S)	860931	TRAFFIC MONITORING STATION (LOCATION 1)	LS	LUMP SUM	LUMP SUM	
245 (S)	860932	TRAFFIC MONITORING STATION (LOCATION 2)	LS	LUMP SUM	LUMP SUM	
246 (S)	032160	FIBER OPTIC COMUNICATION SYSTEM	LS	LUMP SUM	LUMP SUM	
247 (S)	861101	RAMP METERING SYSTEM (LOCATION 1)	LS	LUMP SUM	LUMP SUM	
248 (S)	861102	RAMP METERING SYSTEM (LOCATION 2)	LS	LUMP SUM	LUMP SUM	
249 (S)	861103	RAMP METERING SYSTEM (LOCATION 3)	LS	LUMP SUM	LUMP SUM	
250 (S)	861104	RAMP METERING SYSTEM (LOCATION 4)	LS	LUMP SUM	LUMP SUM	
251 (S)	861105	RAMP METERING SYSTEM (LOCATION 5)	LS	LUMP SUM	LUMP SUM	
252 (S)	861106	RAMP METERING SYSTEM (LOCATION 6)	LS	LUMP SUM	LUMP SUM	
253 (S)	861107	RAMP METERING SYSTEM (LOCATION 7)	LS	LUMP SUM	LUMP SUM	
254	BLANK					
255	150206	ABANDON CLUVERT	EA	3		
256	BLANK					
257	192050	STRUCTURE EXCAVATION (TIEBACK . WALL)	M3	5400		
258	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	M3	3700		
259	193026	STRUCTURE BACKFILL (TIEBACK WALL)	M3	380		
260	193028	STRUCTURE BACKFILL (SOIL NAIL WALL)	M3	110		

ENGINEER'S ESTIMATE**11-080914**

261	197060	SOIL NAIL ASSEMBLY	M	18 000		
262	197036A	EARTH RETAINING STRUCTURE, LOCATION 9	M2	1080		
263	197037A	EARTH RETAINING STRUCTURE, LOCATION 10	M2	2145		
264	500050	TIEBACK ANCHOR	EA	327		
265	510050	STRUCTURAL CONCRETE	M3	1625		
266	510050	COBBLESTONE TEXTURE	M2	2370		
267	511039A	ANTI-GRAFFITI PROTECTIVE COATING	M2	2370		
268	520101	BAR REINFORCING STEEL	KG	248 000		
269	530100	SHOTCRETE	M3	110		
270	597601	PREPARE AND STAIN CONCRETE	M2	2370		
271	727907A	MINOR CONCRETE CHANNEL (TYPE A)	M2	877		
272	731517	MINOR CONCRETE (GUTTER)	M	294		
273	833144A	CONCRETE BARRIER (TYPE KA26A MODIFIED)	M	280		
274	839532	CABLE ANCHOR ASSEMBLY (BREAKAWAY, TYPE B)	M	10		
275	839551	TERMINAL SECTION (TYPE B)	EA	10		
276	839553	END SECTION	EA	10		
277	839568	TERMINAL ANCHOR ASSEMBLY (TYPE SFT)	EA	6		
278	999990	MOBILIZATION	LS	LUMP SUM		

TOTAL BID: _____