STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

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Flex your power!
Be energy efficient!

March 19, 2009

03-Nev,Pla-80-R90.1/R104.6
03-4A6504

Addendum No. 3

Dear Contractor:

This addendum is being issued to the contract for CONSTRUCTION ON STATE HIGHWAY IN PLACER AND NEVADA COUNTIES FROM 4.5 KM EAST OF BLUE CANYON TO 2.2 KM WEST OF HAMPSHIRE ROCKS 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 Wednesday, March 25, 2009.

This addendum is being issued to revise the Project Plans, the Notice to Bidders and Special Provisions and the Bid book.

Project Plan Sheet 57 is revised. A half-sized copy of the revised sheet is attached for substitution for the like-numbered sheet

In the Notice to Bidders, the Contractor license is revised as follows:

"At the time this contract is awarded, the Contractor must possess either a Class A license or one of the following Class C licenses: C-12."

In the Special Provisions, Section 10-1.01, "ORDER OF WORK," the fourth paragraph is revised as follows:

"Work within the stream zone of the tributaries to South Yuba River shall be restricted to periods of low stream flow and dry weather and shall be confined to the period of June 15 to October 15. Tributaries to the South Yuba River include drainage system numbers 2, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 39, 41, 42, 43, 44 and 46."

In the Special Provisions, Section 10-1.14, "CONSTRUCTION AREA SIGNS," the table in the eighth paragraph is revised as follows:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	(800) 642-2444 (800) 227-2600
Underground Service Alert-Southern California (USA)	(800) 422-4133 (800) 227-2600

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In the Special Provisions, Section 10-1.15, "MAINTAINING TRAFFIC," the seventeenth paragraph is revised as follows:

"Special day is July 5th.

During the life of the contract "Hot August Nights" week celebrations will occur in the Reno, Nevada area. The Contractor shall keep all traffic lanes open for use by public traffic on the preceding Thursdays and Fridays in the eastbound direction the week prior to the beginning of the celebration and during the week of this celebration. No lane closures will be allowed in the westbound direction on the 2 Mondays following the beginning and ending weekends of the celebration. No lane closures will be allowed in either direction on Saturdays or Sundays during the Hot August Nights celebrations, which spans 2 weekends as determined by the Engineer. Should this requirement delay the controlling operation as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications, the days will be considered non-working days, except as otherwise noted within these special provisions."

In the Special Provisions, Section 10-1.15, "MAINTAINING TRAFFIC," Chart for "Lane Closure Restriction for Designated Legal Holidays and Special Days" and Chart Nos. 1 and 2 are revised as attached.

In the Special Provisions, Section 10-1.15, "MAINTAINING TRAFFIC," Chart Nos. 3 and 4 are deleted.

In the Special Provisions, Section 10-1.20, "EXISTING HIGHWAY FACILITIES," subsection "PLASTIC PIPELINER," is revised as attached.

In the Special Provisions, Section 10-1.20, "EXISTING HIGHWAY FACILITIES," subsection "CURED-IN-PLACE PIPELINER," is revised as attached.

In the Special Provisions, Section 10-1.20, "EXISTING HIGHWAY FACILITIES," subsection "CLEANING, PREPARATION OF EXISTING PIPE AND PRELIMINARY INSPECTION," is revised as attached.

In the Special Provisions, Section 10-1.30, "MINOR CONCRETE (INVERT PAVING)," the fifth paragraph is revised as follows:

"The contract price paid per cubic meter for minor concrete (invert paving) shall include full compensation for furnishing all labor, materials (including reinforcement), tools, equipment, and incidentals, and for doing all the work involved in minor concrete (invert paving), complete in place, including cleaning of culverts, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer."

In the Bid book, in the "Bid Item List," Item 35 is revised, Items 51 and 52 are added and Items 27 and 50 are deleted as attached.

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To Bid book holders:

Replace the entire pages of 5 & 6 of the "Bid Item List" in the Bid book with the attached revised pages 5 & 6 of the Bid Item List. The revised Bid Item List is to be used in the bid.

Inquiries or questions in regard to this addendum must be communicated as a bidder inquiry and must be made as noted in the Notice to Bidders section of the Notice to Bidders and Special Provisions.

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

Submit bids in the Bid 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.

This office is sending this addendum by GSO overnight mail to Bid book holders to ensure that each receives it. A copy of this addendum is available for the Contractors' use on the Web site:

http://www.dot.ca.gov/hq/esc/oe/weekly_ads/addenda.php

If you are not a Bid 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

JODY JONES
District Director
District 3 North Region

Attachments

Lane Closure Restriction for Designated Legal Holidays and Special Days

Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	**H** xx	xx	xx							
	SD xx									
x	xx	**H** xx	xx							
		SD xx								
	x	xx	**H** xx	xx						
			SD xx	xx						
	x	xx	xx	**H** xx	xxx					
	x	xx	xx	**SD** xx	xxx					
				x	**H** xx					
				x	**SD** xx					
					x	**H** xx				
						SD xx				
						x	**H** xx	xx	xx	xx
							SD xx			

Legends:

	Refer to lane closure charts
x	The full width of the traveled way shall be open for use by public traffic after 14:00 hours.
xx	The full width of the traveled way shall be open for use by public traffic.
xxx	The full width of the traveled way shall be open for use by public traffic until 20:00 hours.
H	Designated Legal Holiday
SD	Special Day

Chart No. 1
Freeway/Expressway Lane Requirements

Direction: **EASTBOUND** Location: 03-Pla/Nev-80-KP R90.1/R104.6

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fridays	X	X	X	X	X	X	X	X	X	X															
Saturdays																									
Sundays																					X	X	X	X	X

Legend:

X	Provide at least one through freeway lane open in direction of travel where there are two existing lanes or provide at least two through freeway lanes open in direction of travel where there are three existing lanes
	No closure allowed.

REMARKS:

- **Two or three existing lanes in EB direction.**
- **See Lane Closure Restriction for Designated Legal Holidays and Special Days in "Maintaining Traffic" of these special provisions for additional closure restrictions.**

Chart No. 2
Freeway/Expressway Lane Requirements

Direction: **WESTBOUND** Location: 03-Pla/Nev-80-KP R90.1/R104.6

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fridays	1	1	1	1	1	1	1	1	1	1															
Saturdays																									
Sundays																						1	1	1	

Legend:

1	Provide at least one through freeway lane open in direction of travel.
	No closure allowed.

REMARKS:

- **Two existing lanes in WB direction.**
- **See Lane Closure Restriction for Designated Legal Holidays and Special Days in "Maintaining Traffic" of these special provisions for additional closure restrictions.**

PLASTIC PIPELINER

General

Summary

This work includes rehabilitating interior of host pipes with plastic pipeliner and filling annular space with grout.

Related Sections

Comply with "Pipeliner" of these special provisions.

Submittals

Submittal procedures must comply with "Pipeliners" of these special provisions.

Submit Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for plastic pipeliner, and joint system and couplers.

Do not start any annular space grouting until the Engineer accepts your submittals for:

1. Grout Plan (Annular Space): Submit a separate grout plan for each kind of grout or variation in procedure or installation and the locations or conditions to which each applies. Before grouting activities start you may change the grout mix, procedure or installation if the Engineer approves. Grout plan must include:

   1.1. Certified test data by independent testing laboratory verifying:

      1.1.1 Proposed grout mix components and proportions
      1.1.2. Proposed grout densities and viscosity
      1.1.3. Initial set time of the grout
      1.1.4. 28-day minimum grout compressive strength
      1.1.5. Grout working time before a 15 percent change in density or viscosity occurs

   1.2. Proposed grouting method and procedures
   1.3. Maximum injection pressures (including last lift at the crown)
   1.4. Proposed grout stage (lift) height and volumes (e.g., Stage 1, to spring line; Stage 2, fully grouted)
   1.5. Bulkhead designs and locations
   1.6. Buoyant force calculations during grouting and a detailed plan for holding the pipeliner on the invert of the existing pipe for a period of time long enough to allow the first lift of grout to set before proceeding to the second lift
   1.7. Provisions for re-establishing lateral connections
   1.8. Pressure gauge, recorder, and field equipment certifications (e.g., calibration by an approved certified lab)
   1.9. Proposed number and location of vents relative to pipe diameter and stiffness and the depth of flow in the pipeline for the grouting operation
   1.10. Strut details
   1.11. Written confirmation that you have coordinated the grouting procedures with the grout installer and the pipeliner manufacturer
   1.12. Calculations or other documentation to verify that the pipe joint will not leak, separate or deform under proposed grouting pressure

2. Grout Mix Design (Annular Space): Submit grout mix design including certified test data verifying that the mix design complies with the density and compressive strength requirements of these special provisions.

Materials

General

Plastic pipeliner must comply with details shown on plans for nominal diameter, thickness, and maximum standard dimension ratio.

You may use any of the following types of plastic pipeliner:

1. Ribbed polyvinyl chloride (PVC) drain pipe as specified in Section 64, "Plastic Pipe," of the Standard Specifications
2. Type S corrugated high density polyethylene (HDPE) pipe as specified in Section 64, "Plastic Pipe," of the Standard Specifications
3. Standard Dimension Ratio (SDR) 35 polyvinyl chloride (PVC) pipe as specified in AASHTO M 278 and ASTM F 679
4. Polyvinyl chloride (PVC) closed profile wall pipe as specified in ASTM F 1803
5. Polyvinyl chloride (PVC) corrugated pipe as specified in ASTM F 794 (Series 46), F 949
6. High density polyethylene (HDPE) solid wall pipe as specified in AASHTO M 326 and ASTM F 714
7. Polyethylene (PE) large diameter profile wall sewer and drain pipe as specified in ASTM F 894

Plastic Pipeliner Joints

Plastic pipeliner joints or couplers must comply with manufacturer's requirements and be compatible with plastic pipeliner installation method (e.g., push only or push/pull into place) and the following:

1. Joint systems for polyvinyl chloride (PVC) corrugated, closed profile, and polyethylene profile wall pipe with a smooth interior for sliplining applications as specified in ASTM F 949, ASTM F 1803 and ASTM F 894, must be field connected with molded or fabricated couplings that do not increase the outside diameter or reduce the inside diameter when assembled.
2. Procedures for making heat fusion joints for high density polyethylene (HDPE) solid wall pipe as specified in AASHTO M 326 and ASTM F 714 must comply with procedures specified in ASTM F 2620, "Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings."
3. Joint systems or couplers must comply with "Standard" shear strength provisions as specified in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications.

Grout Mix (Annular Space)

Grout mix for annular space must consist of low density foam concrete composed of water, cementitious materials and optional chemical admixtures, and the following requirements:

1. Cementitious materials must comply with Section 90-2.01, "Cementitious Materials," of the Standard Specifications and these conditions:

   1.1. Supplementary cementitious materials are not mandatory.
   1.2 Supplementary cementitious materials may only be used if you provide written confirmation from the foaming agent manufacturer stating the foaming agent is compatible with the proposed supplementary cementitious materials.

2. Foaming agent must comply with ASTM C 869.
3. Cast density at point of placement must be from 675 kg/m^3 to 950 kg/m^3 and minimum compressive strength of 1,400 kPa at 28 days.
4. Compressive strength is determined under ASTM C 495 except specimens must be moist cured prior to the 28-day compressive strength test and not be oven dried. When the grout plan calls for more than a single lift, make a cylinder or other test to show that the proposed grout mix will have attained adequate stiffness prior to placement of multiple lifts.

Mix water, cementitious materials and chemical admixtures before adding the foaming agent. Add foaming agent at the job site.

Construction

General

Before installation of plastic pipeliner, comply with Host Pipe Restoration Plan under "Cleaning, Inspecting, and Preparing Host Pipe" of these special provisions.

Protect plastic pipeliner and host pipe during installation to prevent damage.

Grouting Annular Space

Fill the entire annular space between the plastic pipeliner and the host pipe with grout. Before starting this work, if the entire annular space between the plastic pipeliner and the host pipe cannot be filled with grout, and the Engineer approves, you must submit a remedial plan.

Before grouting, the host pipe must be free from water and debris. Do not start grouting activity until the existing water flow has been temporarily diverted and approved bulkheads installed. Start grout injection at the upstream end of the pipe and progress toward the downstream end. Place grout injection tubes and breather tubes with removable plugs around the pipeliner and through the bulkheads.

When grouting, the monitored gauge pressure must not exceed 35 kPa or pipeliner manufacturer's recommendation for plastic pipeliners with a pipe stiffness of less than 200 kPa; and the gauged pumping pressure at the point of injection must not exceed 50 kPa for all other plastic pipeliners. In addition, the pipeliner including the pipe joint system must be able to withstand a static head of grout of 152 mm above the highest crown elevation. Maximum grout pressure for static grout head must not exceed maximum allowable gauged pumping pressure for plastic pipeliner.

Install a grout pressure gauge and recorder immediately adjacent to each injection port to continuously record on paper with ink the actual grouting pressure (to an accuracy +/- 3.5 kPa) versus time. Attach the gauge to a saddle-type diaphragm seal (gauge saver) to prevent clogging with grout. All gauges must be certified, calibrated and comply with ANSI B40, Grade 2A.

If you pressurize the plastic pipeliner, the internal pressure must not exceed the liner manufacturer's recommendation. Your submitted grouting plan must show maximum differential liner pressures equivalent to those specified in these special provisions. Provide written confirmation that you have coordinated your grouting procedures with the grout installer and the pipeliner manufacturer.

Place grout in a continuous manner and inject in lifts not exceeding the height designated in the grouting plan, or less if needed to avoid floating, shifting or deforming the pipeliner. Monitor injection pressure including last lift at the crown. If the pipeliner cannot withstand the grouting pressures or static head, reduce maximum pressure at the point of grout injection or employ staged grouting.

Field Quality Control

Field quality control activities consist of:

1. Monitor and record pressures throughout the grouting process to verify compliance with manufacturer's recommendation for each phase of the process. Submit recorded pressures to the Engineer within 5 days of completion of the grouting process.
2. Deflection Test: After placement of grout, test plastic pipeliner deflection in the presence of the Engineer using the following methods:

2.1. For pipeliners with nominal inside diameter 1 m and less: Pull a mandrel through the pipeliner by hand. Before use, the mandrel must be accepted by the Engineer or by another entity approved by the Engineer. Mandrel must be:

2.1.1. Rigid, nonadjustable, odd-numbered-leg (9 legs minimum) mandrel having an effective length not less than its nominal diameter.

2.1.2. Fabricated of steel.

2.1.3. Fitted with pulling rings at each end.

2.1.4. Stamped or engraved on some segment other than a runner indicating the pipeliner material specification, nominal size and mandrel outside diameter (e.g., HDPE F 714-SDR 26- 36" – 31.569").

2.1.5. Furnished in a suitable carrying case labeled with the same data as stamped on the mandrel.

2.2. For pipeliners with nominal inside diameter greater than 1 m: Determine deflection using a 2.54 cm diameter rigid, nonadjustable metal bar; a minimum radius rigid template; or by another method approved by the Engineer.

3. Acceptance Criteria: The Engineer accepts deflection for installed plastic pipeliner under the following conditions:

3.1. Pipeliner must be continuous over the entire length of the host pipe; free from visual defects such as foreign inclusions, concentrated ridges, discoloration, pitting, pin holes, cracking and other deformities.

3.2. No evidence of over deflection: Evidence of over deflection occurs if the mandrel (or other deflection method) fails to pass through the pipeliner.

3.3. Pipeliner deflection must be the lesser of 5 percent greater than the actual pipeliner dimensions at time of placement (including the pipe joint system) or 6-1/2 percent of the nominal pipeliner dimension.

3.4. If pipeliner deflection exceeds the stated limits, up to a maximum of 8 percent of the nominal pipeliner dimension, the Department deducts 20 percent of the total contract unit price paid per meter for plastic pipeliner installed at that location.

3.5. The Department rejects plastic pipeliner deflected more than 8 percent of the nominal pipeliner dimension.

3.6. There is no segregation or voids in grout.

4. For each batch of grout, you must perform density and viscosity tests under ASTM C 138 and ASTM C 939 in the presence of the Engineer. The Department rejects grout that exceeds +/- 48 kg/m^3 of the design density. The time of efflux (outflow) must not exceed 20 seconds as specified in ASTM C 939 unless the Engineer approves.

Place cement mortar as specified in Section 65-1.06, "Joints," of the Standard Specifications, to form a seal between the host pipe and the plastic pipeliner as shown on the plans. Pipe for the weep tube must be commercial quality, rigid, plastic pipe.

Place paper or cloth wadding at least 152 mm from each end of the existing pipe as shown on the plans to retain the mortar during sealing operations.

Measurement and Payment

The length of plastic pipeliner is measured in meters along the flow line of the host pipe. The Department does not pay for plastic pipeliner placed in excess of the measured length.

The contract unit price paid per meter for plastic pipeliner includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing plastic pipeliners, complete in place, including annular space grouting plan, grouting, sampling, testing, inspecting, and repairing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract unit price paid per meter for plastic pipeliner includes full compensation for furnishing all labor, materials (including mortar and weep tube pipe), tools, equipment, and incidentals, and for doing all the work involved in installing plastic pipeliners, complete in place, including mortaring the ends of the plastic pipeliner, sampling, testing, inspecting, and repairing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

CLEANING, INSPECTING AND PREPARING HOST PIPE

General

Summary

This work includes removing sediments, debris and other accumulated materials, inspecting and preparing a host pipe before pipelining or invert paving.

Submittals

Submittals are:

1. Host Pipe Restoration Plan: At the preinstallation meeting, submit a written plan for each host pipe in a 3-ring binder subdivided into categories listed below. The Engineer reviews the plan including submitted sample video recordings and inspection logs to determine if the quality of the video and still images are acceptable including if defects were properly identified and documented. Do not start work until the Engineer accepts your host pipe restoration plan. Plan must include:

   1.1 Proposed cleaning methods.
   1.2. Plan for control of sediments dislodged during cleaning.
   1.3. Plan for control and diversion of existing stream or groundwater flows. The bypass system must be of adequate capacity and size to handle the flow, including:

      1.3.1. Calculations supporting the sizing of the system.
      1.3.2. Schedule indicating the duration of the flow diversion.

   1.4. CCTV inspection including:

      1.4.1. Sample of a printed CCTV pre-installation inspection log with digital photographs of material not dislodged during cleaning operations, locations where invert repairs are necessary, host pipe joints, lateral connection joints, protrusions, etc.

      1.4.2. Sample video recording of previous host pipe inspection work with audio commentary showing operational and structural defects in pipes that are the same size as those for this work. Sample must be with the same camera and lighting equipment proposed for this work. Specify camera type and model and identify transporter to be used.

   1.5. Sample digital media for human entry inspection:

      1.5.1. Sample video camera pre-installation inspection log, including a printed log with digital photos covering same items under 1.4.1.
      1.5.2. Sample digital photo log.

2. Inspection and Evaluation Report: After completing host pipe cleaning and inspection, submit a written inspection and evaluation report within 7 business days. Include 2 copies of the video recording and one set of digital photographs. Requirements are:

   2.1. Document the location of conditions that might prevent pipeliner installation. Describe proposed repairs of the host pipe, or a statement that no repairs are required before lining. Include a description of conditions you found that might prevent proper installation of the pipeliner, including any sharp or protruding appurtenances that might snag or tear the pipeliner. Include proposed methods to correct those conditions and to re-establish lateral pipe and service openings.

2.2. The Engineer reviews video recordings and digital photographs and inspection and evaluation report within 7 days. If you submit more than one video recording and inspection and evaluation report simultaneously, or an additional materials or documentation before completion of a previous submittal, designate the sequence for reviewing each submittal. The Engineer reviews each additional submittal in 7 days. The Engineer may add an additional 3 business days to the remaining time on each submittal which was under review and delayed by higher priority submittals in the sequence.

3. Grouting Plan: Before injecting voids behind a host pipe wall with grout, submit a grouting plan and grout mix formula to the Engineer for review. The Engineer reviews the grouting plan and grout mix formula in 5 business days. Do not begin grouting until the Engineer accepts your submittal for:

3.1. Grouting plan describing the methods and procedures to be used for the work including:

3.1.1 Order of Work
3.1.2. Maximum injection pressures
3.1.3. Plans for controlling ground water and existing culvert stream flows
3.1.4. Pressure gauge, recorder, and field equipment certifications including calibrations by an approved certified laboratory
3.1.5. Schedule of grout port installations and method for obtaining probe depth dimensions at grout ports, tabulating locations and dimensions for submittal to the Engineer
3.1.6. Culvert strut details, as necessary
3.1.7. Proposed method for monitoring deformation of the culvert or concrete lining

3.2. Grout mix formula of proposed proportions for grouting including:

3.2.1. Grout densities and viscosity
3.2.2. Initial set time of grout
3.2.3. Grout materials and independent laboratory test data as specified in Section 41-1.02, "Materials," of the Standard Specifications
3.2.4. Grout working time before 15 percent change in density or viscosity occurs

Quality Control and Assurance

Qualifications: Experienced personnel trained in locating defects, breaks and obstacles must perform host pipe inspection.

Preinstallation Meeting: Before starting work and within 25 days after contract approval, supervisory personnel involved in the cleaning, inspection and preparation of host pipe and pipeliner or invert paving work must attend a preinstallation meeting with the Engineer to discuss methods of accomplishing the work.

Materials

Slurry Cement Backfill

Slurry cement backfill for filling voids in backfill below a host pipe invert must comply with Section 19-3.062 “Slurry Cement Backfill” of the Standard Specifications.

Grout

Grout mix for injecting voids in backfill behind a host pipe wall must:

1. Comply with Section 41-1.02, "Materials," of the Standard Specifications
2. Contain not more than 2 percent bentonite by weight of cement, and water
3. Contain not less than 350 kilograms of cement per cubic meter

If sand is used in the grout mix, sand must comply with Section 90-2.02B, "Fine Aggregate," of the Standard Specifications with the following grading requirements:

Sieve Size	Percentage Passing
No. 8	100
No. 16	95-100
No. 30	60-85
No. 50	20-50
No. 100	10-30
No. 200	0-20

CCTV Inspection Equipment

CCTV equipment must include:

1. CCTV camera with articulating head
2. Transporter adapted for the conditions of the host pipe to be televised
3. Television monitor
4. Lighting
5. Cables and power sources

CCTV equipment must:

1. Be specifically designed and constructed for pipe inspection
2. Have camera lighting for minimizing reflective glare
3. Have adjustable focal distance through a range from 152 mm to infinity
4. Produce minimum 356 lines per inch resolution for camera and monitor
5. Have remote reading meter counter accurate to 1 percent over the length of the particular section being inspected

Calibration

Verify the accuracy of the distance meter used in CCTV inspection with a walking meter, roll-a-tape or other suitable device accepted by the Engineer.

Electronic Media

CCTV recording must be made in high quality electronic media such as VHS, CD or DVD.

Construction

General

Clean, inspect, and repair host pipe as described in host pipe restoration plan.

Site Preparation

Before host pipe inspection, clean host pipe, remove debris and sediment accumulated in the host pipe invert, and restore flow area to the original flow area or diameter as shown on the plans.

Disconnect downdrains towards the downstream end of the host pipe, as shown on the plans and when encountered in the field as ordered by the Engineer.

Control and divert existing stream or groundwater flow during cleaning activities and subsequent pipeliner work.

Do not let wastewater resulting from the work to enter the waterway. Dispose of wastewater and material under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Before cleaning activities start, inspect the host pipe to determine which cleaning method to use and develop a plan for controlling sediments, debris and other accumulated materials.

Use high-velocity hydraulic cleaning equipment and industrial air mover, or mechanically powered equipment to clean host pipe. For large diameter pipes where human entry is possible, non-mechanically powered cleaning equipment may be used.

Completely remove all sediments, debris and other accumulated material from the host pipe.

Dispose of wastewater and material under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

At your expense, repair damage to host pipe resulting from your activities.

Inspecting Host Pipe

After cleaning, inspect cleaned host pipe either by human entry or CCTV equipment.

During the inspection, review, log and comment on any conditions that require attention before and after installation of the pipeliner or invert paving. Inspect the entire length of the host pipe and document the condition and location of:

1. Any condition that might prevent proper installation of the pipeliner or invert paving
2. Protrusions
3. Collapsed or crushed areas
4. Reduced cross sectional areas
5. Each lateral pipe opening including:

    5.1. Drainage system identification
    5.2. Distance into host pipe
    5.3. Exact position and orientation within the host pipe wall
    5.4. Size or dimensions of the opening
    5.5. Connecting joint
    5.6. Flow direction

6. Each host pipe joint.

During the inspection, perform additional cleaning as required to obtain acceptable quality of video scans and digital photographs and the required level of cleaning under manufacturer's recommendations for the type of pipeliner to be installed. The Engineer may stop the inspection and require additional cleaning before proceeding with the inspection.

Scan each host pipe joint and lateral pipe joint 360 degrees. If the camera does not pass through the entire host pipe, reset the equipment and inspect the host pipe from the opposite direction.

When using human entry inspection, use a hand held video camera and lighting and a digital photo camera to record the inspection of host pipe. Lighting and picture quality must be suitable to provide a clear, in focus, picture of the entire periphery of the pipe under all conditions. Do not exceed CCTV inspection rate of 10 meters per minute.

Record and label all audio and video media for incorporation into the inspection and evaluation report. Video media must include the following:

1. Video:

    1.1. Recording number
    1.2. Inspection date
    1.3. Current distance along host pipe (counter meter)
    1.4. Encoded text description of location, host pipe size, type and length
    1.5. Printed labels on video recording hard copy with location and date

2. Audio:

    2.1. Inspection date
    2.2. Confirmation of tape counter meter orientation and origin
    2.3. Description of host pipe size, type and length
    2.4. Description and location of each defect
    2.5. Description and location of each lateral pipe opening
    2.6. Description of flow direction

Retain a copy of all inspection documentation (cassettes, compact disks, memory sticks, databases, and logs) for the duration of the work.

Filling Host Pipe Voids

Invert Voids: Before installing any pipeliner or invert paving, fill voids greater than 152 mm deep in the backfill below a host pipe invert with slurry cement backfill, as ordered by the Engineer.

Wall Voids: Inject voids greater than 152 mm deep in the backfill behind a host pipe wall with grout, as ordered by the Engineer.

If work involves invert paving, inject voids with grout after structural repair of host pipe and concrete for invert paving achieves 17,237 kilopascals compressive strength. Prevent grout or water from grouting activities to flow into waterways or drainage facilities.

Prevent grout or water from grouting activities to flow into waterways or drainage facilities.

Voids greater than 76 mm deep discovered in the backfill below a host pipe invert must be filled with slurry cement backfill, as ordered by the Engineer. Perform slurry grouting of voids below host pipe invert before pipeliner work.

Repairing Host Pipe

Uncover, remove, and repair surface obstructions greater than 13 mm that cannot be removed by host pipe cleaning activities. Repair all proposed host pipe surface defects identified by the inspection and evaluation report. Do not make any repairs until the Engineer accepts your proposed materials and methods for repairing surface defects and obstructions.

If the Engineer accepts your proposal for repairs, make all proposed repairs to prepare the host pipe for lining and re-establish lateral pipe and service openings.

Measurement and Pavement

Full compensation for cleaning and inspecting host pipe, shall be considered as included in the contract price paid per meter for kind, type and size of pipeliner installed, including furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cleaning andinspecting host pipe, complete in place, including attending preinstallation meeting, preparing submittals, restoring host pipe flow area, control and diversion of flows, host pipe restoration plan, inspection and evaluation report, disconnecting and reconnecting downdrains, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer and no additional compensation will be allowed therefor.

Any work necessary, as determined by the Engineer, including host pipe repair, and disconnecting and reconnecting downdrains not shown on the plans and encountered in the field, is be paid for as extra work under Section 4-1.03D, "Extra Work," of the Standard Specifications.

The Department does not pay for additional cleaning required before lining or invert paving.

When ordered by the Engineer, any cleaning not required by these special provisions is paid for under Section 4-1.03D, "Extra Work," of the Standard Specifications.

Slurry cement backfill, grout injection, hammer soundings and additional probing or other means of void detection ordered by the Engineer is paid for under Section 4-1.03D, "Extra Work," of the Standard Specifications.

CURED-IN-PLACE PIPELINER (CIPP)

General

Summary

This work includes lining a host pipe with a thermosetting resin-impregnated flexible fabric tube. You must use one of the following methods:

1. Inversion installation as specified in ASTM F 1216
2. Pulled-in-place installation as specified in ASTM F 1743

Except as amended under these special provisions, comply with:

1. ASTM D 2990 - Test Method for Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics
2. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
3. ASTM D 883 - Definitions and Terms Relating to Plastics
4. ASTM D 1600 - Abbreviations, Acronyms, and Codes for Terms Relating to Plastics
5. ASTM F 412 - Definitions of Terms Relating to Plastic Piping Systems
6. ASTM F 1216 (including Appendix XI) - Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin Impregnated Tube
7. ASTM F 1743 - Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
8. ASTM D 5813 Standard Specification for Cured-in-Place Thermosetting Resin Sewer Pipe

Definitions

CIPP: Cured-in-place pipeliner consisting of resin impregnated fabric tube, including preliner tube if applicable.
preliner tube: Tube for lining a host pipe before installing fabric tube to facilitate insertion.
fabric tube: CIPP tube.
cured CIPP: CIPP after curing process, including manufacturer's required minimum cool-down time period.
completed CIPP: CIPP after all work is complete including curing and restoration of openings.
segment: Continuous run of CIPP from end to end of a host pipe.

Submittals

Upon receipt of a submittal, the Engineer will review the submittal within 15 business days. Upon notification a submittal is incomplete, re-submit a completed submittal within 5 business days. The Engineer will review any re-submittals within 7 business days or within the number of business days remaining from original submittal, whichever is greater.

Do not start work until the Engineer approves your submittals for:

1. Summary sheet for each drainage system by number identified on the plans that includes:

    1.1. Calculated minimum thickness of liner
    1.2. Manufacturer's recommended post-cure temperatures
    1.3. Manufacturer's recommended pressures (including recommended, minimum cold, maximum heated and maximum cold)
    1.4. Manufacturer's recommended cure time (include effects of anticipated heat sink conditions and variations in post pipe length)
    1.5. Specific resin to be used (by trade name)
    1.6. Expected maximum exotherm temperature
    1.7. Method of liner insertion (i.e., air inversion, water inversion, pulled-in-place, etc.)
    1.8. Proposed cure method (water, hot air/steam, etc.)
    1.9. Proposed length, access and termination points for each segment

2. Manufacturer's documentation in the following order:

    2.1. Resin, resin enhancer (under "Resin Enhancers") and bond enhancer identification and typical properties (under "Bond Enhancers") that includes:

        2.1.1. Identification of supplier
        2.1.2. Resin data test results
        2.1.3. Pipeliner and resin manufacturer's certification that the resin and catalyst system to be furnished meets the requirements of each site where the CIPP will be placed and be compatible for the intended install method, service conditions (as outlined in "CIPP Design Calculations" below) and host pipe material including bituminous coatings
        2.1.4. Certificates of compliance for CIPP under applicable ASTM D 5813, F 1216, or F 1743
        2.1.5. Shipment verification of 1 liquid resin sample (114 g minimum of unreacted resin) to:

            Transportation Laboratory
            METS
            (Attention: Chemical Laboratory)
            5900 Folsom Blvd
            Sacramento, CA 95819

    2.2. Fabric tube description including:

        2.2.1. Identification of supplier
        2.2.1. Types of impermeable membranes and relative juxtaposition (e.g., inner layer, outer layer or both)
        2.2.2. Maximum pulling force so as not to damage fabric tube for pulled-in-place installations

    2.3. Installation procedure guidelines for both insertion and resin curing
    2.4. Sealing materials (quick-set epoxy mortar or high viscosity epoxy or a hydrophilic vulcanized expansive rubber strip)
    2.5. Preliner description, preliner splicing recommendations, and identification of supplier
    2.6. Description of non-toxic lubricant for inversion installation that will not:

2.6.1. Have any detrimental effects on the fabric tube, resin or boiler and pump system
2.6.2. Support the growth of bacteria
2.6.3. Adversely affect the fluid to be transported

3. Record of annual calibration for pressure and temperature equipment performed by an independent third party that includes:

   3.1. Standards traceable to the National Institute of Standards and Technology.
   3.2. Formal reporting procedure, including published test forms.
   3.3. Sample of a temperature and pressure log to be used for monitoring the resin curing process. This log must have temperatures (resin and water or hot air/steam) and pressures noted at 5-minute intervals. The log must identify the drainage system number as indicated on the plans, host pipe diameter, date and fabric tube thickness.

4. Third party, 10,000-hour, 50-year Flexural Creep Modulus test data as specified in ASTM D 2990. If approved 10,000 hour tests are not available, use a minimum 75 percent reduction (25 percent retention) of Flexural Modulus of Elasticity (as specified in ASTM F 1216) for all formula calculations.

5. Certification on Manufacturer's letterhead indicating you are approved by the fabric tube and resin manufacturer to perform CIPP installation work.

6. Material safety data sheets for all hazardous chemicals used or expected to be on the job site including resin, catalyst, cleaners and repair agents. Include information identifying the proposed use for each hazardous chemical and where it will be used in the work.

7. CIPP Design Calculations under the following parameters:

   7.1. Classification of CIPP unless otherwise specified on the plans must be Type II (partially deteriorated) as specified in ASTM D 5813 and in Appendix X1.1.1 of ASTM F 1216.
   7.2. CIPP liner must be designed as specified in Appendix X1.2.1 of ASTM F 1216.
   7.3. Ovality must be assumed at 5 percent.
   7.4. If not specified in the contract document, assume the groundwater level is at 1/2 pipe depth.
   7.5. CIPP design must assume no bonding to the original pipe wall.
   7.6. Calculations determining the proposed CIPP liner thickness at each location must be provided using the drainage system nomenclature and stationing shown on the plans.

Quality Control and Assurance

Comply with "Field Quality Control," including "Sample Requirements (CIPP)," "Quality Assurance (Resin)," and "Core Samples (CIPP Thickness)" of these special provisions.

Materials

Fabric Tube

The fabric tube must consist of one or more layers of flexible needled polyester-fiber felt or an equivalent non-woven material, or a combination of non-woven and woven materials including reinforcing fibers and fabrics capable of carrying resin, and withstanding installation pressures and curing temperatures. The fabric tube must be compatible with the resin system used and be capable of stretching to fit irregular pipe sections and negotiate bends. Longitudinal and circumferential joints between multiple layers of fabric must be staggered so as not to overlap. The fabric tube must be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the host pipe. An impermeable plastic inner liner or outer liner film must be used for resin control, which will remain a permanent part of the system and an integral part of the fabric tube, by bonding or fusing to the fabric tube. The opacity of the plastic coating must not interfere with visual inspection.

Fabric Tube (Inversion Installation)

Upon delivery, the outside layer of the fabric tube must be plastic coated with a material that is compatible with the resin system used. Allowance must be made for circumferential stretching during inversion. A preliner tube sized to fit the host pipe being lined must be used. The preliner tube must be a 3-ply laminate sheet combining two layers of polyethylene film and a high strength nylon cord grid formed into a tube sized to fit the host pipe being lined and must be continuous for the entire length of the host pipe.

Fabric Tube (Pulled-In-Place Installation)

The outside layer of the fabric tube must have an impermeable plastic coating to contain the resin during and after fabric tube impregnation. Allowance must be made for circumferential and longitudinal stretching during installation. The minimum tensile strength of the fabric tube or the reinforced fiber material in the longitudinal and transverse directions must be 5 MPa as specified in ASTM D 1682 test methods.

Resin

Resin must be compatible with the installation process. The resin must be capable of curing in the presence and absence of water. The initiation temperature for curing must be less than 83°C. The resin must be one of the following kinds:

1. Chemically resistant isophthalic based polyester resin
2 Vinyl ester thermosetting resin and catalyst system
3. Epoxy resin and hardener

Thixotropic agents that do not interfere with visual inspection may be added for viscosity control. Resins may contain pigments, dyes, or colors that do not interfere with visual inspection of the resin-impregnated pipeliner or its required properties. The resin must not contain fillers, except those required for:

1. Viscosity control
2. Fire retardance
3. Air release
4. Extension of pot life

The resin system to be used must be manufactured by a company selected by the fabric tube manufacturer. Corrosion resistant polyester, vinyl ester, and epoxy resins must comply with the following requirements:

1. Polyester Resin

    1.1. A resin created by condensation reactions between isophthalic/terathalic acid, maleic anhydride and a glycol. The polymeric product is characterized by reactive unsaturation located along the molecular chain. This resin is compounded with a reactive styrene monomer and reacted together with initiators/promoters to produce cross-linked copolymer matrices.

    1.2. Polyester resins may contain only branched glycols; including, but not limited to, propylene glycol and neopentyle glycol. No PET/Isophthalic polyester is allowed. Polyesters may be either virgin isophthalic acid or virgin teraphthalic acid, but not combinations of both.

2. Vinyl Ester Resin

    2.1. A resin created by reaction products of epoxy resins with methacrylic acid and characterized by reactive unsaturation located in the terminal position of the molecular chain. This resin is compounded with a reactive styrene monomer and reacted together with initiators or promoters to produce cross-linked copolymer matrices.

3. Epoxy Resin

3.1. A resin created by the reaction of epichlorohydrin and Bisphenol-A, Bispehnol-F, (or a Novalac in some cases) to yield a diglycidyl ether (triglycidyl ether in the case of Novalacs) having terminal epoxy rings as the reactive sites.

3.2. An epoxy resin system shall be composed of a diglycidyl ether of Bisphen-A (DGEBPA) or Bisphenol-F (DGEBPF) resin solution, or a mixture of both, and a curing agent compatible with the saturation and cure methods for cured-in-place pipe. The curing agent may be of the catalytic type, an addition curing agent type, or a mixture of both, as specified and proportioned according to the manufacturer's formulation. The epoxy resin system should be essentially free of volatile organic compounds (VOC's), be insensitive to ultra-violet light rays, low odor and be in conformance with the California Code of Regulations Title 8, Subchapter 7, "General Industry Safety Orders" with a flash point classification as combustible liquid, or higher (37.8°C or higher). Sampling and testing shall be in accordance with the provisions in Section 95-1.02, "Sampling and Testing," of the Standard Specifications and these special provisions.

4. Resin Enhancers

4.1. Resin enhancers may be used. The maximum amount of enhancer allowed is 15 kilograms enhancer per 50 kilograms resin. Submit data to certify the maximum amount of enhancer has not been exceeded.

4.2.. Enhancer material must be made in a "batch method" procedure and attested to by the manufacturer. In the submittal for the resin enhancer (under "Submittals") include:

4.2.1 Size range (in microns)
4.2.2. Amount used in the formulated resin
4.2.3 Bond enhancing coating material used
4.2.4 Certification from resin manufacturer or formulator that bond enhancer used is compatible with the resin system used

5. Bond Enhancers

5.1. If using resin enhancers (i.e., aluminum trihydride) or fiberglass reinforced felt, use a suitable bond-enhancing compound (i.e., Silane or equal) to increase the bond between resins and other materials.

5.2. In the submittal for resin enhancers, include certification from the bond enhancer manufacturer that the material is suitable for use in aqueous environments.

Construction

Resin Impregnation

At each location and for each drainage system, notify the Engineer in writing 2 working days before starting resin impregnation process.

At the start of resin impregnation, inspect the entire fabric tube for defects. The fabric tube must be either vacuum-impregnated with resin (wet-out) under controlled conditions, or impregnated with resin and run through a set of rollers separated by a space, calibrated under controlled conditions to ensure proper distribution of resin. The volume of resin used must be enough to fully saturate the voids in the fabric tube material (as well as all resin-absorbing material of the calibration hose if applicable). Certification documentation concerning date, type of resin (manufacturer, trade name and lot number) resin calculation and volume of resin used must be attached to the impregnated fabric tube. The impregnated fabric tube must be stored in an area where the temperature is controlled to 21°C or less.

Inversion Installation

Using the inversion method as specified in ASTM F 1216, the tube end must initially be turned inside out and attached to a platform ring, standpipe, or as approved. The addition of water, air, or steam pressure must be adjusted sufficiently to cause the impregnated fabric tube to invert end to end, and hold the fabric tube tight against the host pipe wall.

The Engineer must witness the installation of each preliner tube. A preliner tube complying with these special provisions must be used to control resin loss, liner thickness, and prevent blocked laterals. For long segments, several sections of preliner tube may be spliced together under the preliner manufacturer's recommendations to form a tube of adequate length.

If you fail to install the required preliner tube over the entire segment (regardless of physical tests and thickness test results), you must remove the CIPP from the host pipe and dispose of it as specified in Section 5-1.09 “Removal of Rejected and Unauthorized Work” and Section 7-1.13, “Disposal of Material Outside the Highway Right of Way,” of the Standard Specifications.

Required Pressures (Inversion Installation)

Before starting an inversion, the fabric tube manufacturer must provide the minimum pressure required to hold the tube tight against the host pipe, and the maximum allowable pressure so as not to damage the tube. During inversion, maintain a pressure between the required minimum and maximum pressures. If at any time during the installation you violate the manufacturer's required minimum and maximum pressures, you must remove the tube from the host pipe and dispose of it as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Lubrication (Inversion Installation)

Use a lubricant during inversion to reduce friction. The lubricant must be poured into the inversion water in the downtube or applied directly to the tube. The lubricant used must:

1. Be non-toxic
2. Not have any detrimental effect on:

    2.1 Tube
    2.2 Resin
    2.3. Boiler and pump system

3. Not support the growth of bacteria
4. Not adversely affect the fluid to be transported

Pulled-in-Place Installation

Using the "Pulled in Place Procedure" as specified in ASTM F1743, the tube must be winched into position under the fabric tube manufacturer's recommendations. The addition of water, air, or steam pressure must be adjusted sufficiently to cause the calibration hose to invert from end to end and hold the fabric tube tight against the host pipe wall.

Resin Curing

After installing the CIPP, regardless of installation method, use a suitable heat source (hot water, steam and/or air) and delivery system capable of providing the required amount of heat uniformly throughout the section to completely cure the resin. The heat source must be fitted with suitable monitors to gauge the temperature of the incoming and outgoing heat supply. Remote sensing devices must be placed at both ends between the impregnated tube and the invert of the host pipe to monitor the outside liner temperatures during the resin curing process. Temperatures from each remote sensing device must be recorded by a strip-chart recorder on a continuous tape. Readings on the tape must represent temperature from start to completion of the resin curing process and draining of CIPP. Record temperature every 5 minutes and submit tape and a log of the recorded temperatures within 48 hours of completing a CIPP segment. Initial curing may be considered complete when the remote sensing devices achieve the manufacturer's recommended curing temperatures for resin and/or catalyst. Curing temperatures and schedule must comply with submitted data and must include an adequate cooling period under "Cool-Down Period." If you fail to comply with the submitted data for curing temperatures and schedule, you must remove the CIPP from the host pipe for that segment (regardless of physical tests and thickness test results) and dispose of it as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Required Pressures (Resin Curing)

Start the resin curing process after you complete dimpling for openings in the host pipe and maintain the required pressure until resin curing process is complete. Record pressure every 5 minutes during the resin curing process. For each installation submit the recorded pressures within 48 hours of completing the resin curing process for CIPP. If the pressure deviates more than 6.9 KPa from the required pressure, you must remove the CIPP from the host pipe and dispose of it as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Required Cool-Down (Resin Curing)

Cool hardened CIPP to below 38°C under manufacturer's recommendations for minimum cool-down period equivalent to starting boiler time to end of the high temperature cure not exceeding a cool-down rate of 9°C to 11°C per hour before relieving the water column or pressure. Cool water may be added to the water column while maintaining circulation as water is drained from a small hole at the opposite end of the CIPP within the requirements of the Water Pollution Control conditions of these special provisions, so that a constant water column height is maintained until cool-down is completed. Do not let a vacuum develop during release of the water column, which could damage the newly installed pipe. If at any time during installation you violate the manufacturer's required minimum cool-down time period or cool down rate, you must remove CIPP from the host pipe for that segment (regardless of physical tests and thickness test results) and disposed of it as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Order of Work

The Engineer must accept your installation of the first pipe liner segment before you start work on any other pipe liner segment.

Field Quality Control

Obtain field-cured samples for each individual CIPP installation and give them to an independent laboratory for testing as specified in these special provisions. Submit independent laboratory's test report within 21 days of cure completion (under "Reporting Test Results"). You pay for obtaining field-cured samples and testing. The Department withholds payment for a CIPP installation until it receives test results.

Independent Laboratory

Independent laboratory must have:

1. Proper facilities, including testing equipment capable of performing tests as specified in ASTM D 790 and infrared spectrographic chemical fingerprint
2. Operators who have received formal training for performing the testing
3. Record of annual calibration of testing equipment performed by an independent third party that has:

    3.1. Standards that are traceable to the National Institute of Standards and Technology
    3.2. Formal reporting procedure, including published test forms

Resin Test

Independent laboratory must:

1. Determine infrared spectrographic chemical fingerprint of the resin sample (under "Sample Requirements")
2. Compare sample fingerprint with fingerprint submitted under "Submittals."
3. Verify the resin sample is the same as the resin submitted and approved for use on this project

The Department rejects a CIPP installed with an unapproved resin and requires its removal as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Physical Property Test

Independent laboratory must:

1. Test physical properties of CIPP samples as specified in:

    1.1. ASTM F 1216
    1.2. ASTM F 1743
    1.3. ASTM D 5813
    1.4. These special provisions

2. Verify that physical properties of CIPP comply with:

    2.1. Minimum initial test values as specified in Table 1 of ASTM F 1216
    2.2. As supplemented in Table 1 (below) for polyester, vinylester, and epoxy resins:

Table 1

Test Description	Test Designation	Minimum Test Value
Flexural Strength	ASTM D 790	31 MPa
Flexural Modulus	ASTM D 790	1724 MPa

3. Test modulus of elasticity and flexural strength of three cured flat plate samples (under "Sample Requirements") for each installation.

The Department rejects a CIPP if any of the following occur:

1. Two of the three cured flat plate samples fail modulus of elasticity test
2. Two of the three cured flat plate samples fail flexural strength test
3. Two of the three cured flat plate samples fail either:

    3.1. Modulus of elasticity test
    3.2. Flexural strength test

Rejected CIPP must be removed as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Sample Requirements (CIPP)

Obtain the following samples for each section of CIPP installation:.

1. One liquid resin sample from the each liner section installed (114 g minimum of catalyzed resin).
2. Three cured flat plate samples each 150 mm x 300 mm in size. Sampling procedures are:

    2.1. Place three aluminum plate clamped molds, each containing a flat plate sample, inside the CIPP during the curing period.
    2.2. Seal each flat plate sample in a heavy-duty plastic envelope inside the mold.
    3.3. Samples must be the same materials (tube and resin/catalyst) used for CIPP installation.

Remove the three cured flat plates samples after draining all the moisture from the cured CIPP. Identify each sample by:

1. Date
2. Project Name
3. Location
4. Size
5. Thickness
6. Resin and Catalyst

Quality Assurance (Resin)

Obtain an additional resin sample as specified in "Sample Requirements" for:

1. First test performed
2. One test randomly selected by the Engineer from next 5 tests or, if less than 5 tests remaining, from portion thereof.

Mark each additional resin sample with this contract number and drainage system number and location where the sample was taken. Ship the additional resin sample to the Transportation Laboratory at the following address for quality assurance testing:

Transportation Laboratory
METS
(Attention: Chemical Laboratory)
5900 Folsom Blvd
Sacramento, CA 95819

Reporting Test Results

Independent laboratory must prepare a test report for all testing performed on each lot. The test report must be signed by an engineer who represents the independent laboratory and is registered as a Civil Engineer in the State of California. The report must include, the following information for each test:

1. Infrared spectrographic chemical fingerprint
2. Flexural Strength
3. Flexural Modulus
4. Any notable defects

Upon receipt of a test report, the Engineer will review the test report within 3 business days. Upon notification a test report is incomplete, re-submit a completed test report within 5 business days. The Engineer will review a re-submittal within 3 business days.

Core Samples (CIPP Thickness)

Obtain a core sample from the CIPP in the presence of the Engineer:

1. From each end of the host pipe (i.e., one sample upstream and one sample downstream)
2. At least 3 m from each end of host pipe or termination point
3. At least 20 mm in diameter from the top of the CIPP
4. On the vertical axis and perpendicular to the horizontal axis

If human entry, samples may be cored internally. Repair cored holes in the CIPP as specified in "Repairs" of these special provisions. Patch cored holes in the host pipe with cement mortar as specified in Section 65-1.06, "Joints," of the Standard Specifications.

As an alternative, the samples may be cored from the top section of the CIPP that has been inverted through a like diameter pipe (and material including insulation/preliner) of at least 3 m in length which has been placed at the end of the host pipe and held in place by a suitable heat sink, such as sandbags or earth with a minimum cover of 150 mm. The cores must be taken 300 mm from the temporary joint with the host pipe.

Remove CIPP material from host pipe core samples. Remove insulating liner, inner liner film or preliner and measure the liner thickness at three spots on each sample. Average the resulting 6 measurements. The average thickness must be equal to or greater than the calculated minimum thickness for the particular section stated on the summary sheet provided in the submittals. The Department does not permit undersize allowance.

If the host pipe material is corrugated metal, thickness of samples must be taken at corrugation crests.

Undersize CIPP Thickness

If the final thickness of the CIPP is less than the calculated minimum thickness in your submittal, then you must do one of the following at your expense:

1. Remove and replace the undersized CIPP.
2. Add a second thin liner designed (at least) to support hydrostatic loads due to groundwater, after acceptable preparation of the undersized CIPP interior.
3. Propose a repair method and if the Engineer approves, repair the undersized CIPP using the approved repair method.

Remediation

The Department rejects a CIPP that:

1. Does not comply with any manufacturer’s recommendation submitted for:

    1.1. Temperature
    1.2. Pressure
    1.3. Cure time

2. Has excessive defects
3. Unrepairable defects
4. Does not comply with these special provisions

You must remove and replace a rejected CIPP at your expense as specified in Section 5-1.09 "Removal of Rejected and Unauthorized Work" and Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Completed CIPP must be:

1.1. Continuous and tight fitting over the entire length of the host pipe
1.2. Free of:

1.2.1. Concentrated ridges, including folds and wrinkles exceeding 2 to 5 percent of the pipe diameter
1.2.2. Dry spots
1.2.3. Lifts
1.2.4. Holes
1.2.5. Tears
1.2.6. Soft spots
1.2.7. Blistering or bubbling
1.2.8. Delamination or defects that would, in the opinion of the Engineer, affect the performance of the CIPP

To comply with above items, the Engineer must approve your remediation plan before you make any repair. The remediation plan must include information adequate to describe the repair methods and must incorporate appropriate submittals in the same way described elsewhere in these special provisions.

If concentrated ridges fall outside the 120-degree invert arc and you demonstrate that grinding does not compromise CIPP structural integrity or reduce CIPP thickness below submitted calculated minimum thickness, you may grind concentrated ridges to required tolerance. After grinding to required tolerance, coat the ground area with the manufacturer's approved resin. At the end of each work day, dispose of any residue generated from grinding as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

If the Engineer approves, you may make internal spot repairs to CIPP. Internal spot repairs may be made using the approved fabric and resins compatible with the CIPP to restore strength and integrity.

If CIPP does not fit tightly against the host pipe at a termination point, fill the space between the CIPP and host pipe with any of the following:

1. Quick-set epoxy mortar
2. High viscosity epoxy
3. Hydrophilic vulcanized expansive rubber strip

If the Engineer approves, you must use repair methods in Table 2 to correct the following defects:

Table 2
Required Defect Repair Methods

Defect	Repair Method
Wrinkles or ridges exceeding 5% and up to 8% of pipe diameter outside of 120 degree invert arc Wrinkles or ridges exceeding 2% and up to 8% of pipe diameter inside of 120 degree invert arc (excluding corrugations in CMP)	Grind to required tolerance. Grind to required tolerance within the lower 120 degrees of the pipe to remove and point repair where needed to maintain minimum thickness or else the Engineer must approve your remediation plan. If wrinkles or ridges exceed 8% of pipe diameter, you must remove CIPP.
Holes, tears, soft spots, and lifts up to 150 mm in major dimension Delaminated areas up to 300 mm in major dimension; blistering or bubbling of the coating on the CIPP surface present over a maximum of 5% of surface area	Point repair under the manufacturer's recommendations. If defect covers a larger area, you must remove CIPP.
CIPP thickness less than calculated minimum thickness	You must remove CIPP. If groundwater conditions allow, you may install a second CIPP within the first that produces a similar dimension ratio to the first lining or else the Engineer must approve your remediation plan.
Annular space at lateral connection or at end of CIPP or infiltration at lateral opening	Seal with quick-set epoxy mortar, high viscosity epoxy or a hydrophilic vulcanized expansive rubber strip.

Measurement and Payment

The length of CIPP to be paid for will be the length in meters measured along the flow line of the host pipe. CIPP placed in excess of the measured length will not be paid for.

The contract unit price paid per meter for cured-in-place pipeliner includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing cured-in-place pipeliner, complete in place, including repairs, providing samples, installing temperature and pressure gauges, as shown on the plans, as specified in the Standard Specifications, these special provisions, ASTM specifications, and as directed by the Engineer.

BID ITEM LIST
03-4A6504

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
21	015731	1060 MM PLASTIC PIPE-LINER	M	31		
22	015732	450 MM CURED-IN-PLACE PIPE-LINER	M	28		
23	015733	600 MM CURED-IN-PLACE PIPE-LINER	M	190		
24	015734	750 MM CURED-IN-PLACE PIPE-LINER	M	73		
25	015735	1200 MM CURED-IN-PLACE PIPE-LINER	M	49		
26	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	
27	BLANK					
28	190115	ASBESTOS COMPLIANCE PLAN (NATURALLY OCCURING ASBESTOS)	LS	LUMP SUM	LUMP SUM	
29	190116	DUST CONTROL PLAN (NATURALLY OCCURRING ASBESTOS)	LS	LUMP SUM	LUMP SUM	
30	198001	IMPORTED BORROW	M3	600		
31	203001	EROSION CONTROL (BLANKET)	M2	180		
32	203016	EROSION CONTROL (TYPE D)	M2	3800		
33	203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	6		
34	390095	REPLACE ASPHALT CONCRETE SURFACING	M3	49		
35	510510	MINOR CONCRETE (INVERT PAVING)	M3	10		
36	690166	450 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.01 MM THICK)	M	96		
37	690170	600 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.01 MM THICK)	M	87		
38	692385	450 MM ANCHOR ASSEMBLY	EA	18		
39	692386	600 MM ANCHOR ASSEMBLY	EA	12		
40	692409	CABLE ANCHORAGE SYSTEM	M	19		

BID ITEM LIST
03-4A6504

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41	705044	450 MM STEEL FLARED END SECTION	EA	13		
42	705045	600 MM STEEL FLARED END SECTION	EA	20		
43	705047	750 MM STEEL FLARED END SECTION	EA	2		
44	705048	900 MM STEEL FLARED END SECTION	EA	1		
45	705050	1200 MM STEEL FLARED END SECTION	EA	2		
46	721009	ROCK SLOPE PROTECTION (FACING, METHOD B)	M3	62		
47	721420	CONCRETE (DITCH LINING)	M3	0.1		
48	729010	ROCK SLOPE PROTECTION FABRIC	M2	220		
49	820112	MARKER (CULVERT)	EA	94		
50	BLANK					
51	016210	760 MM CORRUGATED STEEL PIPE (3.51 MM THICK)	M	6		
52	999990	MOBILIZATION	LS	LUMP SUM	LUMP SUM	

TOTAL BID: _____

REVISED PER ADDENDUM NO. 3 DATED MARCH 19, 2009