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SHA State Highway Administration — Driven to Excel

Robert L. Flanagan, *Secretary*
Neil J. Pedersen, *Administrator*

MARYLAND DEPARTMENT OF TRANSPORTATION

April 2, 2004

RE: Woodrow Wilson Bridge Project
Contract Method for Chemical Grouting
of PT Ducts

Nelson J. Castellanos, Division Administrator
Maryland Division
Federal Highway Administration
10 South Howard Street, Suite 2450
Baltimore MD 21201

APR - 2

Dear Nelson:

The Maryland State Highway Administration (MSHA) requests the Federal Highway Administration (FHWA) approval of MSHA using our construction manager, Potomac Crossing Consultants (PCC), to provide the chemical grouting of PT ducts on the project. A description of this course of action and justification for it (based on cost-effectiveness) are provided below.

The proposed chemical grouting project is described in detail in my letter to Jitesh Parikh, FHWA Project Manager, dated Mar. 2, 2004. In brief, the project includes the following elements:

- Detecting those post-tensioning ("PT") ducts where water is present, by both videoscopic observation and by air pressure testing;
- Evacuating existing water and using a chemical grout product to penetrate small cracks, sealing the cracks against further water intrusion;
- Flushing out excess chemical grout gel and using a pressurized air assist to vacuum out the flush water and any remaining excess gel; and,
- Pressure testing and examining the grouted ducts for integrity using a videoscope.

Based on our current assessment of the number of ducts requiring chemical grouting, the estimated total cost of performing this work is $558,060. This estimate includes all required phases of the effort, such as the costs of the chemical grout and cleanup operation, support services by the bridge contractors, inspection services by PCC, reviews by the engineer of record, and incidental consulting services directly pertinent to the effort. The estimated cost of the duct repair alone [i.e., the portion to be performed by Superior Grouting Services, Inc.] is $271,400. The cost estimate reflects the full bridge, not just the bascule portion. A detailed breakdown of this estimate is enclosed.

Since all of this work is necessary for the structure, MSHA intends that performance of the chemical grouting work and all costs related to it be 100-percent Federally funded. Approved contracting vehicles are already in place through which support services by the bridge contractors, PCC, the engineer of record and incidental consulting services will be obtained.

MSHA proposes to perform the chemical grouting, cleanup, and testing [i.e., the $271,400 portion] under a contract awarded by other than competitive bidding. MSHA will employ Potomac Crossing Consultants (PCC) as a sole-source provider to acquire the chemical grouting service. PCC (a private entity) in turn will subcontract this work to Superior Grouting Services, Inc., under a negotiated contract.

When water intrusion into the ducts was first discovered in August 2003, MSHA confronted rare circumstances that were unusual and unlikely to recur.

At first, no one knew the full extent of water intrusion into the PT ducts. No proven repair method existed—only some ideas of how to proceed. I described some ideas that were considered and later ruled out in my letter to Mr. Parikh. Timing was critical; the BR-3A construction contractor was fully mobilized and pushing to begin installing PT strand in the ducts. The ducts were required to be dry before that process began. Had the water intrusion caused delay to this construction, for which MSHA would have been responsible, daily costs to MSHA (and hence to FHWA) would have mounted rapidly. The potential costs of equipment rental, field overhead, home office overhead, and possible demobilization and remobilization could have reached million-dollar plus levels. The delay impact cost–over $19 million by one estimating approach and $10.9 million by another–would have depended largely upon whether delays were confined to the bascule contract or also affected other contracts in the corridor. A delay cost analysis is enclosed.

Because of the technical uncertainty and the critical scheduling impacts to not only the Bascule contract, competitive bidding for the initial development phase was not an option. Instead, with prior verbal approval from FHWA, an experienced local firm known for successfully grouting groundwater infiltration problems in sewers, dams, elevator shafts, and tunnels, Superior Grouting Services, Inc., was asked to recommend and attempt to perfect a suitable repair method, working on a daily crew rate basis. After choosing a suitable chemical grout, developing special tools for the unusual geometry of the PT duct reducer, and tailoring an evacuation and cleaning method just for this situation, Superior Grouting succeeded. They developed a method that worked and used it to grout 112 individual ducts.

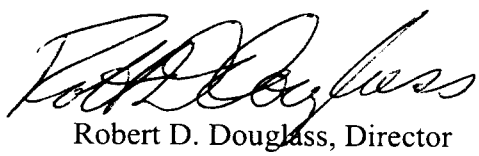
Surveys are now underway to determine the extent of water infiltration in the PT ducts in the areas of contracts BR-3C and BR-3B. It appears that infiltration is less widespread there than it was found to be in the BR-3A area and may involve fewer ducts overall than the number that required grouting at piers M1 and V1 alone. MSHA proposes to continue the work to completion using Superior Grouting Services, Inc., through the PCC contract. PCC has agreed to perform this out-of-scope (construction) work for MSHA on a direct reimbursable basis with no compensatory fee.

To do other than use Superior Grouting on a non-competitive basis to perform the remaining production effort at BR-3C and BR-3B would fail to capitalize on the unique processes and specialized tools Superior developed during the pilot effort. Were MSHA to attempt to put Superior Grouting's detailed means and methods out for bid, an intellectual property dispute could well arise. Under a performance specification, another firm would be starting from scratch, and the additional time required—assuming another firm would even be able to achieve the same technical result—could result in costly delays as described above.

Based on above facts and discussion, we determined that a competitive-based contract to perform the work would either result in lack of bids or bids received would be unreasonable. If we were to face such a situation after advertising the contract, schedule impacts would not be acceptable to the traveling public, and the time delay costs would be in the millions of dollars. Therefore, we believe that it is cost-effective for MSHA to employ PCC as a sole-source provider to acquire the chemical grouting services, and for PCC to subcontract the work to Superior Grouting Services, Inc., under a negotiated contract.

Your approval of this contracting method to complete the duct work on the bridge contracts is requested. Please do not hesitate to give me a call if you wish to discuss this matter further.

Sincerely,
Neil J. Pedersen
Administrator



Robert D. Douglass, Director
Woodrow Wilson Bridge Project

Enclosures
1. Estimate of PT Duct Repair Costs
2. Delay Cost Analysis

cc: Russ Fuhrman, Executive Project Manager, PCC
Paul Gudelski, Assistant District Engineer, SHA
Robert Healy, Deputy Director, Office of Bridge Development, SHA
Jim Ruddell, Construction Manager, PCC

ESTIMATE OF PT DUCT REPAIR COSTS

Location	Description	Unit of Measure	Unit Cost	Quantity	Total Cost
BR-3A	Initial R&D by Superior Grouting	LS	6,500	1	$6,500
	Inspection support to R&D by PCC	Man days	800	7	5,600
	Logistic support to R&D by AB/EKS	LS			4,000
	Whitlock, Dalrymple Poston & Assoc.	LS	1,460	1	1,460
	Field reviews by Parsons	Man hours	100	8	800
	Production Grouting at V1 & M1				
	Grout ducts at V1OL by Superior	# of Ducts	1,100	21	23,100
	Grout ducts at M1OL by Superior	# of Ducts	1,100	24	26,400
	Grout ducts at MI IL by Superior	# of Ducts	1,100	28	30,800
	Grout ducts at V1IL by Superior	# of Ducts	1,100	31	34,100
	Grouting support by PCC	Man days	800	30	24,000
	Logistic support by AB/EKS	LS	70,000	1	70,000
	Whitlock, Dalrymple Poston & Assoc	LS	2,500	1	2,500
	Field reviews by Parsons	Man hours	100	16	1,600
	Complete cleanout of postponed ducts	# of Ducts	250	30	7,500
	PCC inspect cleanout of postponed ducts	Man days	800	5	4,000
	Logistic support by AB/EKS to cleanout	LS	4600	1	4,600
				Subtotal	$246,960
BR-3C	Pre-inspection of ducts by PCC	Man days	700	15	10,500
	Production Grouting by Superior				
	Grout ducts at M2 IL & OL	# of Ducts	1,000	24	24,000
	Grout ducts at M3 IL & OL	# of Ducts	1,000	24	24,000
	Grout ducts at M4 IL & OL	# of Ducts	1,000	3	3,000
	Grout ducts at M5 IL & OL	# of Ducts	1,000	11	11,000
	Grout ducts at M6 IL & OL	# of Ducts	1,000	12	12,000
	Grout ducts at M7 IL & OL	# of Ducts	1,000	18	18,000

	Grout ducts at M8 IL & OL	# of Ducts	1,000	12	12,000
	Grout ducts at M9 IL & OL	# of Ducts	1,000	11	11,000
	Grout ducts at M10 IL & OL	# of Ducts	1,000	4	4,000
	Grouting support by PCC	Man days	700	40	28,000
	Logistic support by Potomac Constructors	LS	150,000	1	150,000
	Field review by Parsons	Man hours	100	8	800
				Subtotal	$308,300
BR-3B	Pre-inspection of ducts by PCC	Man days	700	4	2,800
	There is no indication that water has invaded the post-tensioning ducts in the BR-3B area as was experienced in the marine environment.				
				Subtotal	$2,800
	Entire Bridge Span			**Total**	$558,060

DELAY COST ANALYSIS

1. **Time Impact and Scope of Delay.** Water intrusion into the PT ducts was discovered during the week of Aug. 20, 2003. Superior Grouting was mobilized on the job and beginning developmental work by Aug. 29. Some ducts were released to American Bridge/Edward Kraemer & Sons (AB/EKS) to begin preparing ducts for strand installation during the week of Dec. 4; they began tensioning strand during the week of Dec. 24. Accordingly, it took 17 weeks from the time water intrusion was discovered until ducts were ready to be released to AB/EKS (and another four weeks before Superior Grouting was truly "out of the way.")

Had the services of Superior Grouting (or another firm) been obtained through competitive-based procedures, it is conservative to say that the 17-week process from discovery to correction would have required at least 21 weeks. The additional four weeks would represent minimal times required to devise a performance specification, solicit interest, solicit bids, review bids, and make an award.

At the very least, employing a competitive-based procedure would have delayed AB/EKS by four weeks. At the other extreme, it could have ensued that AB/EKS might have ceased work upon discovery of the water intrusion and, arguably, the entire 21-week delay could have affected not just AB/EKS but also the BR-3B, BR-3C, MA-2/3, VA-4, and VA-6/7 contractors. The latter analysis methodology would be consistent with recent consideration of dredging delay impacts at the Maryland abutment.

2. **Daily Cost of Delay.** During the period of the December 2003 invoice, AB/EKS invoiced for $810,406 of work in place, or $47,671 for each of 17 working days. Thirty-nine people were employed by AB/EKS during that month, and their full suite of cranes was mobilized. Had a competitive-based selection procedure been employed, the month of December 2003 would have been the month that AB/EKS was delayed. Discounting the daily work-in-place by 40 percent to allow for the cost of materials incorporated, a daily delay cost of $28,600 for AB/EKS alone would be a reasonable estimate.

At the other extreme, were all of the contractors in the corridor delayed for up to 21 weeks, an approximation of delay costs could be made by estimating a fixed percentage of their contract amounts to be overhead. The dredging delay impact methodology determined that a range of $35,000 to $50,000 would be appropriate for construction contractors alone, excluding costs of the PCC infrastructure. Including PCC, the daily cost range became $75,000 to $130,000, depending on what decisions were made to reduce staff.

A simplified, middle approach would be to attribute a 28-day delay over the six construction contracts listed above. Their individual base contract amounts divided by the respective number of contract days add up to $389,000 per day.

3. **Cost Calculation.** Using the shortest, most "conservative" duration and scope assumption, i.e., a four-week delay affecting AB/EKS only, the cost parameters above compute a delay cost just over $800,000. This is nearly three times the direct cost of employing Superior Grouting, and any comparison with the potential savings from using a competitive-based selection would be ludicrous.

In the extreme case, had MSHA not moved decisively to solve the water intrusion problem, it could be argued that a 21-week delay might have impacted the six corridor contracts listed above and PCC. At $130,000 per day, the impact would have exceeded $19,000,000.

Using the "middle" approach defined above, a 28-day delay for the six construction contracts would have cost $10,892,000.