Director's Claims Board
ODOT Project 163(04)
Claim 06-040163-07
1500 mm pipe removal and replacement
Decision Issued: July 27, 2010

On Wednesday, May 26, 2010 at ODOT's Central Office in Room 4A, the Director's Claims Board ("Board") heard oral presentations of National Engineering and Contracting Company ("National" or "Contractor") and ODOT District 6 ("District" or "ODOT") relative to the subject issue. Prior to the oral presentations and in accordance with the Dispute Resolution and Administrative Claim Process set forth in the contract, the Board received written documentation from the Contractor on April 24, 2009 and then from the District on March 2, 2010.

The Board consisted of Gary Middleton, P.E., Administrator, Office of Construction Administration; Halle Jones Capers, P.E., Deputy Director, Division of Highway Operations and Tim McDonald, P.E., Deputy Director, Division of Production Management.

The District 6 representatives at the hearing were: Eric Kahlig, Brian Hupp, Jeff Holbrook and Dan Johnson.

Mike Cary, Christine McAnney, Josh Sommer, Greg McVey and Rick Tanferno represented National.

Tom Pannett, P.E., Esq., Administrator, Office of Contracts served as the Secretary of the Board.

Ron Trivisonno, Freddie Cruz and Pam Clawson of ODOT's Division of Construction Management observed the hearing.

PROJECT DESCRIPTION:

This $114,893,813.13 contract was signed with National Engineering and Contracting Company on April 20, 2004. The current contract amount is $130,549,278.76. The original contract completion date was June 30, 2007. The revised completion date was February 2, 2008. The project was opened to traffic on November 14, 2008 and physical work was complete on February 25, 2009.

This project constructed new interchanges at SR 161 and Sunbury Road and IR 270 and SR 161, constructed new collector distributor roads adjacent to IR 270 and SR 161, widened Sunbury Road and constructed new, reconstructed and widened various bridges.

CLAIM OVERVIEW:

National Engineering is requesting compensation for the removal and replacement of approximately 1010 meters (3313 ft.) of 1500 mm (60 inch) pipe. This pipe is the main drainage conduit for SR 161 Westbound between Big Walnut Creek and Little Turtle Road.

National initially installed this drainage structure from July 2004 until December 2004. During a March 1, 2005 inspection it became apparent some of the pipe joints had failed. As time went on the pipe appeared to deflect consistently throughout the pipe run. The installation was not acceptable due to "significant dimpling, joint separation, buckling, racking, bedding loss and deflection". On March 16, 2006 ODOT directed National to remove and replace the defective pipe at no cost to the

Department.

The replacement pipe reinstallation began April 2006 and was completed in January 2007. Force Account records were kept for this work and submitted to ODOT by National for payment in the amount of **$2,538,464**. ODOT has refused to reimburse National claiming it was National's means and methods that caused the failure.

CONTRACTOR'S POSITION:

National agrees the original installation of this 1010 meters of 1500 mm conduit failed and had to be replaced. However, National states it installed the pipe according to all contract documents therefore it is not responsible for the failing outcome nor the costs to remove and replace the original pipe installation. ODOT's Construction and Material Specification Manual (C&MS) Section 603 provides detailed means and methods of pipe installation, all of which National states it followed.

The bid items for this drainage structure were:
(Reference 146) 521.87 m of 1500 mm conduit, Type B
(Reference 148) 490.12 m of 1500 mm conduit, Type C
(Reference 149)120.4 m of 1500 mm conduit, Type C, 706.02 (62.5 D Load)

C&MS Section 603.02 provides a list of many kinds of pipe the contractor can use to meet the specifications for Type B and Type C conduit unless a particular conduit type is specified. The plans specifically required the use of Reinforced Concrete Pipe with a 62.5 D Load (Reference 149) from station CDW 127+120 to CDW 127+220. National opted to use corrugated high-density polyethylene (HDPE) smooth lined conduit for the unspecified Type B and C conduits.

National used granular material certified by ODOT as meeting the specifications for Structural Backfill Type 2. C&MS 603.09 allows the contractor to use mechanical devices or flooding to attain compaction of this backfill material. National opted to flood sand.

National noted it gave notice to ODOT there could be a problem with the pipe installation in March 2005, three months after the completion of the installation. All testing, investigation and inspection of the failure of the pipe was done after this notice. National stated the failure of the pipe had already began and progressed from that time until it was removed.

National claims that when it began the pipe trench excavation it encountered a large amount of groundwater flowing from the shale cut. Although National was pumping throughout the installation they could not control the amount of water in the trench. To aid in the pipe installation National requested permission to switch to Type 3 Structural Backfill. The District denied that request.

National stated in its presentation "Basically we were installing the pipe under water". The specifications did not require water tight joints. National theorizes that the cause of the failure was the migration of fines through the joints. The loss of the material created voids. The water saturated the backfill material, reducing the lateral strength of the structural backfill. This allowed the pipe to shift and created the significant dimpling, joint separation, buckling, racking, bedding loss and deflection that ODOT used to justify the removal of the pipe.

Following the pipe failure National installed monitoring wells to observe the height of the water in the backfill material. These wells showed that the water table fluctuated up and down with rains. The HDPE pipe has flexibility. These continuous cycles of water table fluctuations would have caused this

particular type pipe to move both horizontally and vertically in the trench and work loose the joints. National stated this accounts for the condition of the pipe when it was inspected by ODOT. National reiterated it did not install the pipe in this condition. National pointed out that ODOT had inspectors monitoring the pipe installation work and noted if it had installed the pipe incorrectly there would have been documentation of discussions between ODOT and contractor staff.

National stated it installed all joints and grout collars at all the manholes as per the specifications. It pointed out there was no supporting evidence provided by ODOT that a grout collar was missed or incorrectly installed or that there were any joints installed incorrectly.

National also stated there is no evidence the flooding process it elected to use as per 603.09.C was inadequate. ODOT's own documentation showed that National held up the pipe installation process while water trucks were used elsewhere on the project for dust control. ODOT has produced no supporting evidence the flooding was not done according to specification. ODOT has admitted it did no compaction testing on the backfill material.

National referred to technical literature, found during its research of possible causes of the failure, which directs the designer to consider the conditions in the field when specifying pipe. For example, HDPE pipe should not have been used in areas of overly saturated soils; however, ODOT's C&MS Section 603.02 did not limit the selection of pipe type in this location. There was no direction in the plans to utilize water tight joints and no stipulation to adjust installation processes for the type soil encountered. National claims this is a design flaw which led to the failure of the pipe run.

National alleged the 29 foot overburden in the area of Little Turtle Road exceeded ODOT's own allowable design criteria for the use of HDPE pipe. National noted there were no contract requirements to eliminate HDPE pipe from the list of 603.02 pipe choices based on depth of fill over a pipe.

National also hypothesized that the load from the Cast-in-Place Retaining Wall 16 could have contributed to the failure of the pipe in the pipe run between Manhole #13 and Manhole #16. As evidence, it pointed to ODOT's design change locating the reinstalled 1500 mm pipe away from the wall.

National's cost for the removal and reinstallation of the 1500 mm pipe was three times the original price bid for that run of pipe. National cited the following as reasons for the cost increase:

1. Original installation was in wide open spaces providing easier access to the work.
2. Open spaces allowed stockpiling near the work area in the original installation.
3. Smaller equipment was required because access was limited. This decreased production rates.
4. Concrete pipe has a larger OD so National personnel had to hand chip manholes to provide access.
5. Installation of replacement pipe required working around and to already installed manholes.
6. Retaining walls were in place by the time the replacement pipe was installed.
7. Removal of original pipe included in cost.
8. It was necessary to maintain drainage around both the new and the original pipe installation.

In summary, National stated that it bid to do the work using HDPE pipe and flooding in the bedding and backfill, both of which were permissible alternatives by C&MS 603. National stated it followed all the means and methods specified in 603 and no ODOT documentation exists that disputes that point. It points out the Contractor is not responsible for doing any design work under C&MS 603. It alleges proper engineering design requires modification of specification criteria based on soils and site

conditions encountered, which ODOT did not do. It also attempted to mitigate potential installation problems by proposing the use of Type 3 Structural Backfill and that request was denied by ODOT. National did remove and replace the conduit as requested by ODOT and claims it is entitled to reimbursement of its costs as submitted in their documentation and below:

Pipe Investigation	$ 6,342.77
Stage # 1 Remove and Reinstall	1,335,257.34
Stage #2 Remove and Reinstall	409,468.22
Schedule Impact	732,395.87
Consulting Costs	55,000.00
TOTAL	**$2,538,464.20**

DISTRICT'S POSITION:

The pipe supplier, Advanced Drainage Systems (ADS) attributed the failure to installation issues. ADS states in its letter dated March 22, 2006 that its product will perform satisfactorily if installed per the specifications. In a letter dated November 28, 2005 ADS states that 30,000 lb/ft of force would be required to move the conduit after installation and backfill. The District questions if that kind of force could be generated post-installation allowing the pipe system to move as National is claiming.

Grout collars were not installed and/or completed in a timely fashion. The District alleged most structures sat for months prior to grouting. The Districts stated National was notified of this on numerous occasions including progress meetings and e-mails starting in late 2004. This gap between the pipe and the manhole allowed the bedding and backfill to escape with resulted in voids around the pipe.

An existing 54" conduit located below a portion of the new 1500 mm pipe was to be removed or filled and plugged as required by the contract. However, the Contractor failed to remove, fill and plug the pipe as required by the plan. This void provided another path through with bedding and backfill was lost.

The District alleged the volume of water required for the flooding of the bedding and backfill was inadequate. There were also several instances of excessive lift thicknesses of backfill material. The District stated there were verbal discussions on these issues on many occasions between inspectors and National personnel as well as in several progress meetings. The lack of density could have exacerbated the material loss, the District hypothesized. ADS attributes the racking of the pipe to uneven placement and compaction of the pipe bedding and backfill material.

The District alleged many of the joints between the sections of pipe were not joined such that the inner surfaces were flush and even as required by the specifications. Technical information provided by ADS states soil tight joints will resist 5 to 6 psi. The District questions if that kind of force could be generated to separate the pipe joints post-installation.

C&MS Section 105.10 warns Contractors: "The Department's failure to identify defective work or material shall not, in any way, prevent later rejection when defective work or material is discovered, or obligate the Department to grant acceptance under 109.11 or 109.12." It is the Contractor's responsibility to comply with all specifications whether or not the work was inspected and/or tested or corrective action notices were issued by ODOT to the Contractor during the installation.

C&MS Section 603.02 does not allow the comprehensive use of Type 3 (57 aggregate) for backfill material. It is allowed only when pumping cannot control the groundwater. The District alleges

National planned to use 57 aggregate for this entire pipe run citing as evidence that National had already began stockpiling 57s prior to beginning trench excavation.

In response to National's allegation of under-design along the concrete retaining wall, ODOT's plan design consultant recalculated the line of influence under the concrete retaining walls. They confirmed only the area specified as D-loading required would be affected by the weight of the walls.

The District agrees backfill material was lost as a result of water draining through the trench but argues this is due to lack of grout collars, openings left unprotected, gaps at pipe joints and the 54" pipe left in place.

National provided specifications from several other states and technical material from various manufacturers but the District argues this is all irrelevant because National did not bid based on this information but from ODOT specifications, which it did not follow.

The District reviewed National's cost submittals and noted the total replacement cost was $1.74 million whereas the original installation was bid at $610,000. ODOT argues this replacement work should have been even more productive than the original bid work because the shale trench had already been excavated.

C&MS Section 109.05 details the method of calculation of reimbursement costs for Extra Work. In its review of National's cost submittals the District noted several instances in which National's submittal deviated from that allowed in C&MS 109.05 or the District's documentation of the Work disagreed with National's documentation. Those notes are attached. In summary, for the pipe investigation and stage 1 and stage 2 pipe removal and reinstallation National requested $1,751,068.33. The District's calculations based on their field records and applying C&MS 109.05 total $1,548,781.

DIRECTOR'S CLAIMS BOARD DECISION:

I. Facts

The Board finds that the majority of facts contained in the submissions and presentations by the parties are either consistent or undisputed and can be relied upon to form the basis of this decision. The following facts are central to the decision:

1. Considerable deflection / deformation of the 1500 mm flexible conduit did occur at numerous locations and the contractor did perform the requisite conduit replacement.

2. The excavation for the 1500 mm conduit was performed through shale with undetermined intermittent amounts of water flowing into the trench from the adjacent shale resulting in fluctuating ground water levels surrounding the conduit.

3. Item 603 of the 2005 Construction and Material Specifications permits the use of Type 2 Structural backfill material which includes sand. Additionally, item 603 permits flooding as a compaction option. Specified backfill and compaction options are selected and priced by the contractor during the bid preparation and submission process. Use of performance based conduit construction Supplemental Specification 802, Post Construction Inspection of Storm Sewers and Drainage Structures, is optional.

4. The contractor backfilled the 1500 mm conduit using materials and compaction methods permitted by the contract specifications.

5. Neither the Department nor the contractor performed compaction testing on the 1500 mm conduit backfill material since flooding was chosen as the compaction method.

6. The contractor initiated a request to change the composition of the entirety of the backfill material to Type 3 Structural Backfill as evidenced by correspondence contained in Exhibit N of National's claim submission due to water in the conduit trench. The contractor was referred to the applicable C&MS provision, 603.02, which limits use of the Type 3 materials to control water in the trench when pumping operations do not control severe ground water problems.

7. The photo documentation provided by the District indicates that the contractor did not construct portions of the 1500 mm conduit consistent with the requirements of the specifications.

8. Written documentation in email form dated January 20, 2005, from Brian Hupp, ODOT Project Engineer, to Mark Myers, National Engineering, was provided that indicated non-compliance issues regarding the 1500 mm conduit following installation.

9. ASTM D 2321 – 00 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications Section 5.3 describes characteristics of materials recommended for embedment in this application. Section 5.3.1 indicates that "Class IA materials provide maximum stability and pipe support for a given density due to angular interlock of particles. With minimum effort these materials can be installed at relatively high densities over a wide range of moisture contents. In addition, the high permeability of Class IA materials may aid in the control of water, and these materials are often desirable for embedment in rock cuts where water is frequently encountered. However, when ground water flow is anticipated, consideration should be given to the potential for migration of fines from adjacent materials into the open-graded Class IA materials (sec XI.8)." Sec XI.8 discusses Migration.

II. Conclusion

A Contractor has the right to rely upon the representations made in the contract documents describing the requirements for the work and to determine its operations and price accordingly. The contractor had the ability to select the conduit installation specification governing the 1500 mm conduit at the time of bid. In the case at hand, it is contractually permitted and reasonable that the Contractor bid to perform the 1500 mm conduit installation pursuant to Item 603 of the 2002 Construction and Material Specifications. There is no requirement in the contract documents that the Contractor has the duty to assess site conditions before proceeding with the installation of the 1500 mm conduit pursuant to item 603. Changing the Work from item 603 to item 802 would have an impact on the Contractor's means, methods, and costs. And, the contractor did not have a contractual obligation to pursue this change in construction methodology.

The Board first turns to C&MS Section 603 to determine National's compliance with the as-bid

specification requirements. The Board is persuaded by the facts and the information at hand that the construction materials and compaction methodology selected by National was clearly allowed by the contract. The Board is further convinced that National provided Work that violated the construction requirements of item 603 contributing to an inferior 1500 mm conduit installation. The Board is also persuaded that ground water conditions were not adequately evaluated by the Department in order to identify a sufficient conduit installation which was also a contributing factor.

The Board is most persuaded by the marked difference between ASTM D 2321 – 00 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications Section 5.3.1 and the construction materials and methodology permitted by the 2002 Construction and Materials Specifications, Item 603. The distinct difference is that the backfill material for conduit in rock cuts with ground water intrusion for item 603 does not meet the ASTM Standard recommendations for embedment.

Next the Board evaluates the impact. The Board is persuaded by and accepts as fact that National provided materials as set forth in the 2002 C&MS, Item 603. The Board also accepts the ASTM D 2321 – 00 Standard Practice as the measure for embedment/backfill sufficiency.

Based on the above the Board determines that National has proven partial entitlement for its claim.

The Board determines that an apportionment of responsibility is reasonable in this matter based on the fact that the Department provided a design that deviated from a nationally recognized standard and National provided a finished product with workmanship deficiencies.

Therefore, the Board will not accept the entirety of the calculations provided by National as representative of their damages due to the workmanship issues.

DAMAGES:

Based on the findings above the Board finds the Contractor is entitled to compensation for the reinstallation of the 1500 mm pipe; however, in recognition of flawed workmanship by the Contractor during the installation of the original pipe the Board also finds a deduction must be taken for the installation of the originally installed pipe.

National's force account costs as submitted totaled $1,751,068.33 (Pipe Investigation plus Pipe Removal and Replacement). ODOT reviewed this submittal and adjusted this force account value to $1,548,781. The deductions taken and reasons for those changes are detailed in an attachment to this decision.

National has previously been paid $430,813.60 (Reference Numbers 146 and 148) for the original installation of the 1500 mm pipe. A deduction for this payment from the corrected force account to re-install the pipe ($1,548,781 - $ 430,813.60) yields a subtotal of $1,117,967.40 for installation costs.

Additionally, the Board recognizes the material (pipe and backfill) permitted by ODOT specifications contributed to the failure of the original installation. Therefore, ODOT will pay for the costs of the materials used in the original installation. Since ODOT does not have any record of material costs used in the original installation the Board will assume the rule of thumb of: ⅓ for labor, ⅓ for materials and ⅓ for equipment. For the purposes of resolution of this claim the Board sets the value of the materials at $143,604.51 (⅓ of $480,813.60) and adds that to the subtotal for reinstallation above ($1,117,967.40 + $143,604.51) for a total of $ 1,261,571.90.

The Board rejects National's request for $55,000 of Consulting Costs. C&MS Section 109.08.D disallows reimbursement of such costs. The Board will not rule on the claimed $732,392.87 for Schedule Impact under this Claim. Sufficient information was not provided by either Party to support or refute this request.

Based on the above findings and calculations the Contractor is entitled to $1,261,571.90 as reimbursement for the removal and installation of this 1500 mm pipe.

This recommendation submitted this 1st day of August, 2010.

Director's Claims Board:

Gary Middleton, P.E.
Administrator, Office of Construction Administration

Halle Jones Capers, P.E.
Deputy Director, Division of Highway Operations

Tim McDonald, P.E.
Deputy Director, Division of Production Management

Approval of this recommendation:

Jolene M. Molitoris

8/4/10

Jolene M. Molitoris
Director, Ohio Department of Transportation

Date

Original Amount of Claim Request

• Pipe Investigation	$6,342.77
• Stage #1 Remove and Reinstall	$1,335,257.34
• Stage #2 Remove and Reinstall	$409,468.22
• Schedule Impact	$732,395.87
• Consulting Costs	$55,000.00
• Total Cost	$2,538,464

Pipe Investigation and Stage #1 and #2 Remove and Reinstall Components

Backfill Material quantity

- Submitted 22,147 tons for Stage # 1 & 2
- No Backfill Material on Approved Force Accounts
- Bedding and Backfill Calculations yield 12,128 tons using 8' trench width, an average backfill over pipe of 2.5' (½ type A and ½ type B pipe) and 10% waste
- Net Cost decrease =10,019 tons @ $10.93/ton (avg. cost)= **$109,507**

Superintendant Costs

- Per 2002 Construction and Material Specification 109.05.C.2,

  The Department will pay wages for foreman in direct charge of work,

  but will not pay for persons above a foreman with only general supervisory

  responsibility of the work.
- Submitted 467.5 hours of Labor
- Submitted 452.5 hours of Equipment
- Net Cost decrease (including mark-ups) **$ 26,525**

Force Account Revisions (1st Phase) - Discrepancies on force accounts vs.NEC submission

- Labor discrepancies **$10,059**

4/12, 4/18, 4/20,4/27, 5/1, 5/2, 5/8, 5/9,5/17, 5/26, 5/31, 6/5, 6/6, 6/7, 6/8, 6/13, 6/19, 6/27, 7/6,7/7, 7/17

- Materials discrepancies **$4205**

  5/9-75cy LSM used to fill existing pipe that NEC was to have filled and left in place, but had not and created a void(sinkhole) $3375

  5/22-10cy LSM-Note on force acct. stating that only 10cy out of 20cy was needed for integrity of CB. $450

  5/25-Note stating 2cy Class C used elsewhere on project $130

  6/29-Note stating 4.5cy Class C used elsewhere on project $250

- Owned Equipment **$9200**

  4/10, 4/12, 4/13, 4/19, 4/20, 4/21, 4/25, 4/26, 4/27, 4/28, 4/29, 5/1, 5/2, 5/3, 5/4, 5/6,5/8, 5/9, 5/10, 5/11, 5/12, 5/15, 5/16, 5/17, 5/18, 5/19, 5/23, 5/30, 5/31, 6/1, 6/2, 6/5, 6/7, 6/8, 6/10, 6/16, 6/17, 6/23, 6/27, 6/30, 7/6, 7/7, 7/17

- Consistently idle owned equipment-full days **$4400**

  Dynapac- Idle 28 of 35 days $87/day

  IR Compressor- Idle 30 of 43 days $18.50/day

  2 Rivot busters- Idle 27 of 42 days $7.60/day

  Cat Dozer- Idle 8 of 13 days $152/day

- Rented Equipment discrepancies **$6900**

  4/12, 4/13, 4/17, 4/20, 4/25, 4/27, 5/1, 5/2, 5/3, 5/4, 5/5, 5/6, 5/8, 5/9, 5/10, 5/11, 5/12, 5/15, 5/17, 5/18, 5/19, 5/22, 5/23, 5/25, 5/26, 5/31, 6/1, 6/2, 6/5, 6/6, 6/7, 6/8, 6/9, 6/10, 6/12, 6/13, 6/14, 6/15, 6/16, 6/17, 6/19, 6/20, 6/21, 6/29, 7/5, 7/7, 7/11

- 3rd Party discrepancies-SBE Trucking **$9300**

  5/8, 5/9, 6/9, 6/16, 6/19, 7/11

Force Account Revisions (2nd Phase)

- Labor discrepancies **$7526**

10/16, 10/19, 10/20, 12/7, 12/8, 12/19, 1/2, **1/4, 1/9,** 1/101/11, 1/12, **1/15**, 1/19, 1/22,

- Materials discrepancies **$6200**

NEC invoiced 6 manholes, ODOT documented 4. 2 others were ordered mistakenly by NEC

- Owned equipment- Consistently idle owned equipment-full days **$6000**

  CAT 330C-Idle 14 of 19 days $264/day

  IR Compressor- Idle 38 of 41 days $16/day

  Dynapac- Idle 25 of 30 days $65/day

- Rented equipment- Consistently idle owned equipment-full days **$2955**

  CATD-5N XL Dozer-10/27-11/9-Idle 12 of 17 days $100/day
  1/9-no force acct. record, then used 1hr. on 1/10 and idle 1/11-1/16 Idle 6 of 7 days

  Multi-Quip P33FM-10/27-12/8 21 days idle $55/day

Schedule Impact Component

- Submitted Cost of Schedule Component **$732,396**
- Per 2002 Construction and Material Specification 109.05.D of the Contract Documents, payment of work via force account constitutes full compensation for all delay costs.
- Revised Schedule Impact Component: $0

Consulting Costs Component

- Submitted Cost of Consulting Costs Component **$55,000.00**
- Per 2002 Construction and Material Specification 109.08 of the Contract Documents, the contractor is not entitled to claim preparation expenses.
- Revised Consulting Costs Value: $0

Revised Amount of Claim Request (at Step #3 hearing)

• Investigation, Remove & Reinstall	$1,548,781
• Schedule Impact	$0
• Consulting Costs	$0
• Total Cost	$1,548,781

Revised Amount of Claim Request (current document) $1,548,291

Note: This document corrects addition error from previous document. Several mark-ups have not been removed.