

GARTH L. WILSON
ENGINEERING AND CONSTRUCTION INSIGHTS

November 23, 2009

Chris Boespflug, Project Engineer
Colorado Department of Transportation
1050 Lee Hill Road
Boulder, CO 80302

Justin DuMond, Project Manager
Flatiron Constructors Intermountain
10090 I-25 Frontage Road
Longmont, CO 80504

Reference: CDOT Project IM-0253-160
FCI Job No. 4106

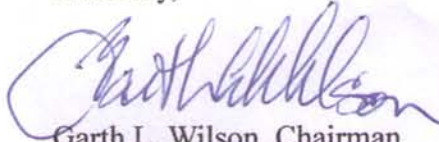
Dear Chris and Justin,

In response to your requests to the Disputes Review Board (DRB) to determine merit relative to Dispute #11 on the referenced Project, we enclose our recommendation herewith. In accordance with Subsection 105.22(g), one original signed copy of the recommendation is provided to each party.

We await further direction in this matter.

As discussed during the meeting on November 18, 2009, we understand that no further disputes are to be referred to the DRB. Accordingly, on behalf of the DRB, I thank you and your staff for the professional manner in which we have been received. It has been a pleasure helping work through the issues that were referred to us.

Sincerely,



Garth L. Wilson, Chairman
For the DRB

Enclosures

cc: Bill Ashton
Dick Fullerton

8101 E. DARTMOUTH AVE. #49 • DENVER, CO • 80231-4259
PHONE: 303/368-8630 • CELL: 303/819-5558
E-MAIL: CONSULT.GARTH@Q.COM

IM0253-160
Dispute Review Board Recommendation

DISPUTE #11 – MSE Retaining Wall Quantities - \$128,585.25 and no time

Documents Reviewed:

A. Contract and Bond:

1. Project No. IM 0253-160 Contract;
2. Special Provisions (Standard and Project);
3. Standard Specifications for Road and Bridge Construction (2005);
4. Supplemental Specifications;
5. Plans (Standard and Detailed);
6. Flatiron's Proposal;
7. Contract Modification Orders 1 through 7.

B. Correspondence:

1. CDOT Speed Memo #74 dated 4-4-07 w/comments on MSE wall submittal;
2. CDOT Speed Memo #104, undated w/comments on MSE wall resubmittal;
3. CDOT Speed Memo #127 dated 8-17-07 w/comments on MSE wall resubmittal;
4. CDOT Speed Memo #140 dated 9-17-07 w/comments on MSE wall resubmittal;
5. CDOT Speed Memo #145 dated 9-25-07 approving MSE wall resubmittal;
6. FCI letter dated 5-1-08 w/Notice of Dispute for Working Day Charge;
7. FCI letter dated 6-26-08 claiming differing site condition at MSE wall foundation;
8. FCI letter dated 9-19-08 w/HTM letter dated 8-26-08 regarding quantities;
9. CDOT Speed Memo #389 dated 10-3-08 w/letter attached;
10. FCI letter dated 10-22-08 w/HTM letter dated 10-13-08;
11. CDOT Speed Memo #418 dated 11-3-08 w/FCI comments dated 11-6-08;
12. FCI letter dated 11-14-08 w/HTM letter dated 11-14-08 as Notice of Dispute;
13. CDOT Speed Memo #427 dated 11-15-08 w/letter describing Request for Equitable Adjustment (REA) requirements;
14. FCI letter dated 12-9-08 as its REA claiming differing site condition and w/HTM letter dated 12-5-08;
15. CDOT Speed Memo #465 dated 2-3-09 w/attached letter denying merit;
16. CDOT Speed Memo #468 dated 2-5-09 regarding MSE wall calculations (no attachments provided);
17. FCI letter dated 2-9-09 rejecting denial w/HTM letter dated 2-10-09;
18. CDOT Speed Memo #497 dated 3-28-09 w/MSE wall design calculations for 26 ft high wall.
19. CDOT Speed Memo #501 dated 4-7-09 requesting calculations for MSE wall design used for shop drawings;
20. FCI comment dated 4-9-08 (sic) transmitting HTM letter dated 4-9-09 w/ shop drawing design calculations;
21. FCI comment dated 4-27-09 w/ HTM letter dated 4-23-09 requesting CDOT calculations for 20 ft high MSE wall;
22. CDOT Speed Memo #507 dated 4-28-09 w/ calculations for 20 ft high gravity wall;
23. CDOT Speed Memo #509 dated 5-12-09 w/quantity adjustment for reinforcement length;

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24. FCI comment dated 8-5-09 w/HTM letter dated 8-3-09 accepting quantity adjustment for reinforcement length presented with SM #509 but challenging validity of calculations submitted w/ SM #507;
25. CDOT Speed Memo #517 dated 8-17-09 requesting meeting to review Escrow Bid Documents;
26. FCI e-mail dated 8-19-09 agreeing to review the Escrow Bid Documents on 8-20-09;
27. FCI Pre-Hearing Position Paper dated 11-5-09 (with attachments);
28. CDOT Pre-Hearing Position Paper dated 11-6-09 (with attachments).

Discussion:**A. Sequence:**

Flatiron Constructors Inc. (FCI) subcontracted the MSE wall work to HTM Construction Co. (HTM) who engaged SAC Design Group (SAC) to prepare the design. Several design iterations with calculations were submitted to CDOT for approval, the last of which was submitted on 9-20-07 and approved by CDOT on 9-25-07.

A meeting at site on 9-19-07 between CDOT, FCI, HTM and geotechnical representatives concluded that poor foundation soils under the MSE walls were to be removed. FCI removed and replaced unsuitable foundation soils under the southbound MSE walls (D-17-AA and D-17-AD) on 9-20-07 and construction of the wall started the next day. Construction of the southbound walls was completed on 11-2-07. Unsuitable foundation soils were removed and replaced under the northbound MSE walls and construction of the northbound MSE walls (D-17-AB and D-17-AC) was performed from 6-19 to 7-15-08.

FCI submitted a request for additional payment for certain MSE wall items by letter dated 9-19-08. After CDOT denied the request, further exchanges were made until FCI submitted a Notice of Dispute and then a Request for Equitable Adjustment citing "a differing site condition". Ultimately, CDOT authorized additional payment for removal and replacement of unsuitable foundation soils under the MSE walls, but did not agree to pay anything more for the MSE wall items beyond what was shown on the Bid Plans (except for a small adjustment in the soil reinforcement volume).

Apparently, through meetings and further exchanges, resolution was not obtained so the matter was referred to the DRB to determine merit only (not quantum).

B. Procedures:

Subsection 105.21 *Dispute Resolution* (as revised by CMO No. 3) provides specific steps to be taken when a dispute arises and before the issue is presented to the Dispute Review Board (DRB).

1. The DRB is proceeding on the basis that those prescribed steps have been followed.
2. No indication is made on either Pre-Hearing submittal that a copy of the Position Paper was provided to the other party as required by subsection 105.22(e) but the parties confirmed at the Hearing that the documents were exchanged.
3. In many respects the presentations are incomplete but clarifications obtained during the Hearing have been used by the DRB to make this recommendation.

C. Positions:

CDOT considers that the FCI Notice of Dispute was submitted beyond the required time period so should not be considered at all. If the matter is to be considered, CDOT interprets the Contract provisions such that payment for MSE wall items 206-00000, Structure Excavation; 206-00100, Structure Backfill (Class 1); and 206-00360, Mechanical Reinforcement of Soil are to be made based on the quantities shown in the bid documents rather than actual installed quantities. The CDOT position is based on its interpretation of certain contract provisions and the opinion that some of the design criteria were used incorrectly by HTM. CDOT disputes certain loads used for the MSE wall design prepared for FCI/HTM.

FCI/HTM stated during the Hearing that the MSE wall contractor accepts full responsibility for the design because the Revision of Section 504 (f) requires that "All engineering calculations shall be certified and stamped by a Professional Engineer licensed in the State of Colorado" and contends that the MSE wall design prepared for HTM properly incorporated the requirements for load factor design in the AASHTO 16th Edition, when the calculations were made and the shop drawings were prepared. Because Sheet 404, prepared by the Engineer of Record, included reference to traffic surcharge, HTM felt obligated to incorporate that live load into their design. FCI/HTM further states that those calculations and shop drawings were reviewed and approved by CDOT showing the loads applied and changed quantities so FCI/HTM should be paid at bid unit prices for the work actually installed.

D. Contract Provisions:

1. Subsection 104.02(a) *Differing Site Conditions*. states in part:
"During the progress of work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the Contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the Contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.

... No Contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice."

2. Subsection 105.02 *Plans, Shop Drawings, Working Drawings, Other Submittals, and Construction Drawings* states in part:

"(a) *Plans*. The Contract will show lines, grades, ... location and design of all structures...."

"(b) *Shop drawings, Working Drawings and Other Submittals – General*. All work shall be performed in accordance with the plans, reviewed shop drawings, working drawings, or other submittals."

"The Contractor shall be responsible for the accuracy of all dimensions and quantities shown on the shop drawings, working drawings, and other

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submittals.... The Contractor shall be responsible for all information that pertains to the fabrication process and methods of construction.”

“... The Contractor shall notify the Engineer, in writing, at the time of submittal of shop drawings, working drawings, and other submittals, of any information submitted that deviates from the requirements of the plans and specifications. In addition, specific notation of the deviations or changes from the plans and specifications shall be placed on the shop drawing, working drawing or other submittal.”

“... The format of the shop drawings, working drawings, and other submittals shall be as follows:

... 6. The shop drawings, working drawings, other submittals and all revisions shall be signed and sealed for the Contractor, by a professional engineer registered in the state of Colorado when required by the specifications.”

Table 105-1 specifies that if the Contractor proposes an alternative design for the MSE Walls, it must be sealed by the Contractor’s Professional Engineer.

“(c) *Shop Drawings*. ... The Engineer will review the shop drawings to evaluate that general conformance with the design concept and that general compliance with the information given in the plans and specifications has been achieved. The review does not extend to accuracy of dimensions, means, methods, techniques, sequences, schemes, procedures of construction, or safety precautions. The review by the Engineer is not a complete check. Review of the shop drawings does not relieve the Contractor of the responsibility for correctness of the shop drawings.”

3. Subsection 206.06 *Method of Measurement* states in part: “Structure excavation, structure backfill, and bed course material will not be measured but will be the quantities designated in the Contract. When field changes are ordered or when there are errors on the plans, quantities will be measured as follows:
 - (a) For bridges and irregular shaped structures, quantities will be computed to neat lines 18 inches outside and parallel to the outline of the revised foundation plan or as shown on the plans.
 - (b)
 - (c) Backfill and filter material will be the calculated volume of material lying within the prism shown on the plans, from which shall be deducted the volume occupied by the structure.”
4. Subsection 504 was added by Addendum during the bidding phase of the Project.
 - a) The *Description* subsection states in part:

“...The MSE reinforcement quantities for this zone will be measured and paid for indirectly by the volume of backfill material being reinforced. The

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design chart(s) in the plans for this project define the strength required for the mechanical reinforcement of soil. Based on the total summed Long-term Design Strength (LTDS), the reinforcement proposed by the shop drawings for a specific wall height allowing a maximum of +/- 15% variation for individual layer shall meet or exceed the total quantities shown in the plan.”

“Wall layouts shall conform to the lines and grades in the plans including starting, corner, and ending stations, leveling pad step breaks, total number of blocks and associated top of block elevations.”

b) The *Construction Requirements* subsection states in part:

“(e) **Excavation and backfill.** ... Should the excavation for the placement of the leveling pad expose an unsatisfactory bearing material, the Engineer may require removal and replacement of that material. The removed material shall be replaced with Structure Backfill (Class 1) compacted in conformance with Subsection 206.03. ... Payment for removal and replacement shall be in accordance with the Standard Specifications.”

c) The *Method Of Measurement* subsection states in part:

“Unless otherwise defined on the plans, the materials and labor for installing MSE retaining walls will be measured and paid for with four major components (structure excavation, structure backfill, block facing and soil reinforcement). ... According to the typical sections shown on the plans, structure excavation is measured by the total of removed earth before the installation of reinforced zone, structure backfill is the total volume behind the wall including the material in the reinforced zone and soil reinforcement is measured by the total volume of the reinforced zone.

The square foot (square meter) and cubic yard (cubic meter) quantities computed for payment shall be based on wall plan quantities measured at 20’ (6 m) maximum intervals (segments) along the wall layout line.”

d) The *Basis Of Payment* subsection states in part:

“The accepted quantities will be paid for at the contract unit of measurement for the pay items listed below:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Mechanical Reinforcement of Soil	Cubic Yard
Block Facing	Square Foot

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Payment will be full compensation for designated materials and labor including all miscellaneous items that are necessary to construct concrete block facing MSE walls. Structure Excavation and Structure Backfill (Class 1) will be measured and paid for in accordance with Section 206.”

5. Certain Contract drawings contain references that are pertinent to this matter including:
 - a) Sheet 394 *Excavation and Backfill* has General Notes that state in part: “Unless shown otherwise in the plans, this drawing gives the minimum extent of Structure Excavation and Structure Backfill. The Contractor may elect to extend the Structure Excavation and Structure Backfill beyond the limits shown here. Any additional Excavation or Backfill beyond these limits will not be measured nor paid for.”
 - b) Sheet 402 *General Information & Summary of Quantities* identifies the Design Data to be used for the MSE walls including AASHTO, 16th Edition – MSE Walls; and Load Factor Design. Quantities based on the CDOT design are tabulated for each wall.
 - c) Sheet 403 *MSE Wall Layout* shows a plan view of the walls, together with a tabulation of key points with station, offset and elevation data.
 - d) Sheet 404 *MSE Wall Details (1)* provides additional Design Data as well as dimensions, lines and grades, pay limits and other details – including where a traffic surcharge is to be applied.
 - e) Sheet 405 *MSE Wall Details (2)* presents a tabulation of data for the CDOT design as well as additional design guidelines.
 - f) Sheet 406 *MSE Wall Details (3)* shows additional dimensions and details.

E. Reference Documents:

1. Article 5.8 *Mechanically Stabilized Earth Wall Design* in the AASHTO Standard Specifications for Bridge Design includes the following relevant references:
 - a) Article 5.8.9 *Special Loading Conditions* states in part:

“Concentrated line loads shall be incorporated into the internal design by using a simplified uniform vertical distribution of 2 vertical to 1 horizontal to determine the vertical component of stress with depth within the reinforced soil mass.

Traffic loads shall be considered in accordance with the criteria outlined in Article 3.20.3”
2. Section 3 *Loads* in the AASHTO Standard Specifications for Bridge Design includes several relevant references including:
 - a) Article 3.20.3 states: “When highway traffic can come within a horizontal distance from the top of the structure equal to one-half its height, the pressure shall have added to it a live load surcharge pressure equal to not less than 2 feet of earth.”
 - b) Article 3.20.4 states: “Where an adequately designed reinforced concrete approach slab supported at one end by the bridge is provided, no live load surcharge need be considered.”

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- c) Article 3.22 provides formulae for load combinations and guidelines to satisfy the requirements for Load Factor Design.

F. Evaluation:

1. The DRB was advised during the Hearing that the issue of additional structure excavation for the foundation of the southbound MSE wall in 2007 was resolved through the payment for additional excavation and aggregate base course (Class 3) as well as structure excavation and backfill for that foundation.
2. A similar issue was raised in June 2008 when the northbound MSE wall foundation was exposed. This apparently precipitated a Notice of Differing Site Condition from FCI which was initially denied by CDOT and appealed by FCI. The DRB was advised at the Hearing that ultimately, payment for all MSE wall foundation items was made based on CDOT Form #266's.
3. The matter of payment for Structure Excavation, Mechanical Reinforcement of Soil and Structure Backfill (Class 1) for the MSE walls themselves is the subject of this dispute.
4. Documentation provided to the DRB for resolution of the issues is incomplete but clarifications were obtained during the Hearing.
5. Several CDOT Form #266's dating from 10-25-07 to 8-15-09 have recorded the bases upon which CDOT has made payments (see attached Table).
6. FCI acknowledged during the Hearing that it was in error by submitting this matter as a Differing Site Condition issue. Rather it is a disparity in interpretation of certain specification provisions.
7. CDOT advised during the Hearing that the design in the bid documents prepared by URS did not include any traffic surcharge load because, as provided under AASHTO Article 3.20.4, none is required when the reinforced concrete approach slabs are supported at one end by the bridge abutments.
8. On the other hand, the FCI MSE wall designer, HTM/SAC, applied a traffic surcharge - because such loading was shown on Sheet 404 and from HTM's experience, the application of such loads is required. By applying this surcharge, the reinforcement lengths (RL's) required by the HTM/SAC design were longer than what was shown on the bid documents. Consequently, the structure excavation, mechanical reinforcement of soil, and structure backfill (Class 1) volumes would need to be increased substantially.
9. The longer strap lengths, additional volumes and the traffic surcharge load were shown on the shop drawings and/or design calculation sheets submitted for approval. The DRB was not provided with copies of the documents transmitting the shop drawings and calculations (from HTM to FCI or from FCI to CDOT). Therefore, the DRB can only conclude that the specific notice, in writing, to the Engineer required by Subsection 105.02 was not provided in those transmittals. Therefore, the Engineer was not notified that additional costs would be requested as a result of the changes.
10. The Engineer reviewed and approved the shop drawings. However, CDOT advised during the Hearing that, although it had noticed the longer RL's, additional volumes and traffic surcharge information on the shop drawings and calculations, CDOT did

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- not consider it was contractually obligated to remind FCI that payments would be based on plan quantities, not shop drawing quantities.
11. It was acknowledged by all parties that payment for mechanically reinforced soil would be made based on the minimum strap length of 8 feet used by HTM/SAC rather than 6 feet used by URS in accordance with the bid documents. A change order was prepared to increase the Mechanical Reinforcement of Soil volume in those segments where the minimum length was so adjusted.
 12. However, no payment adjustment has been made to compensate FCI/HTM for the increase in the required volumes of Structure Excavation and Structure Backfill (Class 1) that would be inherent when the strap length is increased from 6 to 8 feet.
 13. Payment was made for the Block Facing based on field measurement of the area of the installed blocks in accordance with Subsection 504.
 14. After the walls were built, FCI submitted an invoice for payment based on shop drawing quantities. Payment was denied by CDOT who considered that the Contract allowed for payment for plan quantities only. HTM and FCI protested that decision.
 15. The DRB did not check the calculations performed to confirm whether or not the RL's and related volumes were correctly established in either the CDOT/URS or the FCI/HTM design.
 16. Several incomplete, illegible and/or garbled documents were in the pre-hearing submittals.

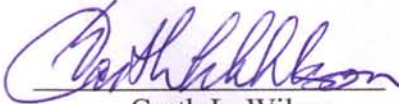
Recommendation:

- A. The DRB finds no merit to the FCI request to be paid for MSE wall work based on quantities shown on the shop drawings. This recommendation is amplified as follows:
 1. The DRB concludes that the AASHTO provisions, taken in relevant entirety, do not require the application of a traffic surcharge in this specific instance because the approach slabs are supported on the bridge abutments.
 2. FCI did not provide the timely written notice to the Engineer, required by Subsection 105.02(b), of any deviations from the requirements of the plans and specifications. That Subsection notes such written notice is in addition to specific notations shown on the shop drawings.
 3. FCI should be paid at bid unit prices for the volumes of Structural Excavation and Structural Backfill (Class 1) in the prism associated with those segments of MSE walls where the minimum strap length was increased from 6 feet to 8 feet. This compensation applies because it is impossible to require an increase in strap length without an associated increase in excavation and backfill. Subsection 206.06 provides for such payment when there are errors on the plans.
- B. This recommendation may be taken under consideration with the understanding that:
 1. The DRB Recommendation was a proceeding based on presentations by the parties.
 2. No fact or expert witnesses presented sworn testimony or were subject to cross-examination.
 3. The parties to the DRB were not provided with the right to any discovery, such as production of documents or depositions.
 4. There is no record of the DRB hearing other than the Recommendation.

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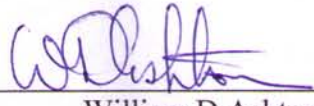
- C. The DRB offers the following comments in a step towards avoiding similar disputes:
1. The confusion between measurement and payment provisions described in Section 504 as they conflict with the provisions of Subsection 206.06 should be removed. The DRB would suggest that payment for MSE walls be based on the area of block facing (to include excavation, soil reinforcement and backfill). With proper guidelines for design, the bidder would make every effort to minimize the variables in order to win the job.
 2. Bid drawings, when prepared for a specific project as opposed to a general application, should reflect conditions anticipated by the design. In this case, Sheet 404 should not have included a generic reference to a traffic surcharge which is in conflict with the AASHTO requirements for this specific design. General data drawings should contain a note that the information shown is generic – Sheet 405 in this instance.
 3. The Engineer should be more proactive and considerate during the submittal review process. Despite the provisions of Subsection 105.02(c) which absolves the Engineer of responsibility to do so, had the proposed and obvious changes been pointed out with the review comments to be unpaid extras, it is likely that this dispute could have been avoided.
 4. All parties should make a more conscientious effort in preparing their positions. Relevant documents should be included and irrelevant information should be removed. Positions should be established and presented only after a critical review of relevant documents and data without exaggeration or misstatements.

Respectfully Submitted:



Garth L. Wilson

11/23/09
Date



William D Ashton

11/23/09
Date



Richard Fullerton

11/23/2009
Date

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MSE Walls – Summary of Measurements:

D-17-AA (Southbound-South Wall)			
Form #266	Description	Date	Measurement
0324-3	Aggregate Base Course (Class 3)	10-31-08	61 cy
	Aggregate Base Course (Class 3)	4-15-09	61 cy
1140-1	Structure Excavation - foundation	10-25-07	27 cy
1140-4	Structure Excavation - partial	10-25-07	359 cy
1140-5	Structure Excavation - complete	6-13-08	1435 cy
1140-8	Structure Excavation – adjusted	10-31-08	61 cy
	Structure Excavation – adjusted	4-15-09	61 cy
1150-1	Structure Backfill (Class 1) - foundation	10-25-07	27 cy
1150-3	Structure Backfill (Class 1) – partial	11-2-07	791 cy
1150-4	Structure Backfill (Class 1) - complete	7-14-08	1055 cy
1160-2	Mechanical Reinforcement of Soil – partial	11-2-07	559 cy
1160-3	Mechanical Reinforcement of Soil - complete	7-14-08	745 cy
1160-5	Mechanical Reinforcement of Soil - adjusted	8-15-09	6 cy
1185-2	Block Facing – partial	11-2-07	1348 sf
1185-3	Block Facing - complete	7-14-08	2736 sf
D-17-AB (Northbound-South Wall)			
0324-1	Aggregate Base Course (Class 3)	10-31-08	87 cy
	Aggregate Base Course (Class 3)	4-15-09	87 cy
1015-2	Structure Excavation - partial	6-15-08	718 cy
1015-4	Structure Excavation - foundation	6-30-08	19 cy
1015-5	Structure Excavation - complete	7-14-08	1435 cy
1015-8	Structure Excavation – adjusted	10-31-08	87 cy
	Structure Excavation – adjusted	4-15-09	87 cy
1025-1	Structure Backfill (Class 1) – complete	7-14-08	1055 cy
1025-2	Structure Backfill (Class 1) – foundation	6-30-08	19 cy
1035-1	Mechanical Reinforcement of Soil – complete	7-14-08	745 cy
1035-3	Mechanical Reinforcement of Soil – adjusted	8-15-09	6 cy
1060-1	Block Facing	7-14-08	2867 sf
D-17-AC (Northbound–North Wall)			
0324-2	Aggregate Base Course (Class 3)	10-31-08	73 cy
	Aggregate Base Course (Class 3)	4-15-09	73 cy
1015-3	Structure Excavation - partial	6-15-08	715 cy
1015-6	Structure Excavation - complete	7-14-08	1430 cy
1015-9	Structure Excavation – adjusted	10-31-08	73 cy
	Structure Excavation – adjusted	4-15-09	73 cy
1025-3	Structure Backfill (Class 1) – complete	7-14-08	1040 cy
1035-2	Mechanical Reinforcement of Soil – complete	7-14-08	720 cy
1035-3	Mechanical Reinforcement of Soil – adjusted	8-15-09	6 cy
1060-2	Block Facing	7-14-08	2903 sf
D-17-AD (Southbound-North Wall)			
0324-4	Aggregate Base Course (Class 3)	10-31-08	57 cy
	Aggregate Base Course (Class 3)	4-15-09	57 cy
1140-2	Structure Excavation - foundation	10-25-07	25 cy
1140-3	Structure Excavation - partial	10-25-07	440 cy
1140-6	Structure Excavation - complete	6-13-08	1760 cy
1140-9	Structure Excavation – adjusted	10-31-08	57 cy
	Structure Excavation – adjusted	4-15-09	57 cy
1150-2	Structure Backfill (Class 1) – partial	10-25-07	915 cy
1150-5	Structure Backfill (Class 1) – complete	7-14-08	1220 cy
1160-1	Mechanical Reinforcement of Soil – partial	10-25-07	664 cy
1160-4	Mechanical Reinforcement of Soil – complete	7-14-08	885 cy
1160-5	Mechanical Reinforcement of Soil - adjusted	8-15-09	8 cy
1185-1	Block Facing – partial	10-25-07	1630 sf
1185-4	Block Facing - complete	7-14-08	3223 sf