

CHAPTER 7 DRAINAGE, EROSION, TRAFFIC CONTROL, AND BARRIER ITEMS REVIEW

7.1 PURPOSE

To delineate the methods for the District Final Estimates Office (DFEO) to use in reviewing final quantities on those erosion, drainage, and traffic barrier items detailed under incidental construction in the applicable edition of the **Standard Specifications**. Payment is in accordance with the Contract Documents.

7.2 PROCEDURE

7.2.1 Curb, Traffic Separator, and Barrier Wall

All items in this section are normally to be paid as plan quantity, subject to **Article 9-3 of the Specifications**. If reviewing is required, spot-check as follows:

- (A) Concrete Curb and Gutter: The items to be reviewed using these procedures are the various types of curbs and gutters constructed in conformity with the lines, grades, dimensions, and notes shown in the plans.
 - (1) The length of curb or curb and gutter should be checked by calculating the difference in station values as noted on the plans. This is usually done block by block in municipal areas. Pay special attention to equations.
 - (2) Check connections to existing curb and limits on returns to determine if final construction limits agree with original plans.
 - (3) Finding overlaps or omissions in pay quantities; these areas should be clearly delineated by drawing a cloud around the effected area and denoting with an explanation on an 11" x 17" set of plans as the items are checked. Final Flight Aerial photos may also be used for this purpose. Eliminating overlaps or omissions may also be done by a careful check of the start and stop stations for each section to be paid.
 - (4) Verify plan dimensions along the face of the curb for all returns, variable connections and curves that require correction in length.

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- 1 | (5) Confirm that inlets, manholes, or other appurtenances have been
2 | deducted from the length of curb and gutter to be paid.
- 3 | (6) Reinforcing steel in curb and gutter is not paid for and shall be
4 | included in the cost for the items in which it is placed.
- 5 | (7) Verify that the method or combination of methods of measurements
6 | reasonably reflects the finished work as authorized by the Project
7 | Engineer (PE).
- 8 | (8) Valley Gutter, Special Gutter, and Asphaltic Concrete Curb are also
9 | paid by the linear foot or linear meter based on plan quantity and
10 | should be checked according to the previously mentioned methods.
- 11 | (B) Concrete Traffic Separator: Quantities are paid for by the linear foot or linear
12 | meter based on plan quantity subject to the type separator shown in the
13 | plans, completed and accepted. Or, it may be paid for per square yard or
14 | square meter.
- 15 | (1) Check the plan dimensions along the centerline of the separator.
- 16 | (2) The full width under the separator should be stabilized, when
17 | applicable, and paid under the item of stabilizing.
- 18 | (3) Check for equations, when lengths or areas are based on station-to-
19 | station dimensions.
- 20 | (C) Barrier Wall: The plan quantity in linear feet or linear meters based on plan
21 | quantity subject to **Article 9-3 of the Specifications** of the type detailed in
22 | the plans completed and accepted shall be the quantity paid for.
- 23 | (1) This item shall be reviewed in accordance with the lines and grades
24 | shown in the plans.
- 25 | (2) Reinforcing steel is to be included in the price of the Concrete Barrier
26 | Wall, unless otherwise provided by the plans or Special Provisions.
- 27 | (3) Check plan details and notes for payment disposition of light-
28 | standards, inlets, etc., that encroach into the barrier wall.

29 | 7.2.2 Miscellaneous Concrete Paving Items

- 30 | (A) Concrete Sidewalk: The quantity to be paid for shall be the plan quantity in
31 | place completed and accepted per **Article 9-3 of the Specifications**. When

- 1 reviewing is required:
- 2 (1) No deductions shall be made for the area occupied by ornamental
3 trees, manholes, inlets, drainage structure, or public utility
4 appurtenances within the normal sidewalk area.
- 5 (2) All steel reinforcement required shall be included in the costs of the
6 concrete sidewalk.
- 7 (3) Verify plan lengths by station-to-station dimensions, final chained
8 measurements, or a combination of both. Check for equations.
- 9 (4) To reveal possible overlaps or omissions in pay quantities, if time
10 permits and at the reviewer's option, use colored pencils to shade in
11 areas checked on an 11" x 17" set of plans as the items are checked.
12 Final Flight Aerial photos may also be used for this purpose.
13 Eliminating overlaps or omissions may also be done by a careful
14 check of the start and stop stations and widths for each section to be
15 paid.
- 16 (5) Confirm that all sections removed and replaced through no fault of the
17 Contractor have been properly noted and that the Contractor has
18 been paid for their removal and replacement.
- 19 (6) Ensure that different shapes and thickness have been properly coded,
20 calculate areas.
- 21 (7) Special concrete sidewalk as specified in the special provisions shall
22 be measured per linear foot or linear meter.
- 23 (8) Concrete traffic islands shall be considered, measured, and paid for
24 per square yard or square meter as concrete sidewalk, excluding the
25 area paid for as curb and/or curb and gutter.
- 26 (9) Note that any required excavation for the sidewalk shall be paid for
27 under the items for the grading work.
- 28 (B) Concrete Ditch and Slope Pavement: The quantities to be paid are the Plan
29 Quantities subject to **Article 9-3 of the Specifications** in place, completed,
30 and accepted. When reviewing is required:
- 31 (1) Verify the areas of ditch pavement using the station-to-station limits
32 indicated on the final plans and/or the final measurement book(s) or
33 latitude and departure sheets. ([See Figure No. 6-2](#))

- 1 | (2) Check the **Daily Report of Construction Form (Form # 700-010-13)**
2 | (project diary) and explanations of Overrun and Underruns for
3 | authorization of extended limits.
- 4 | (3) To reveal possible overlaps or omissions in pay quantities, if time
5 | permits and at the reviewer's option, use colored pencils to shade in
6 | areas checked on an 11" x 17" set of plans as the items are checked.
7 | Final Flight Aerial photos may also be used for this purpose.
8 | Eliminating overlaps or omissions may also be done by a careful
9 | check of the start and stop stations and widths for each section to be
10 | paid.
- 11 | (4) Check the calculation of toe walls, headers, or cutoff walls and baffles
12 | to see that they have been converted into equivalent square yards or
13 | square meters of standard thickness. ([See Figure No. 7-1](#))
- 14 | (5) Do not deduct for areas occupied by standard manholes, inlets, etc.
15 | Non-standard structures and appurtenances may require special
16 | handling and /or measurements.
- 17 | (6) Excavation below finished grade, refilling, and disposal of surplus
18 | materials, shall be included in the costs of the paving item.
- 19 | (C) Riprap: The quantities to be paid for under this item shall be the volume in
20 | cubic yards or cubic meters of: sand actually used in the sand-cement
21 | mixture; or of concrete blocks used, grout, and tons or metric tons of rubble
22 | satisfactorily placed and accepted. Check the appropriate Tabulation Forms,
23 | which will document the quantity used each day at each location. If the
24 | Department's Engineering Quantities Program was used, verify all
25 | keypunching, output, and the transfer of the summary to the Computation
26 | Book. Only the volume of sand-cement riprap, concrete blocks, or poured-in-
27 | place concrete placed within the neat lines shown in the plans, for a toe-wall,
28 | shall be included in the volume calculation of the final toe-wall quantities.
- 29 | (1) Rubble Riprap: Rubble riprap shall be measured by the ton or metric
30 | ton, in surface-dry natural state by railroad scales, truck scales, or
31 | barge displacement. For a typical barge displacement calculation
32 | ([See Figure No. 7-2](#))
- 33 | (a) Verify that the certified weight tickets and/or appropriate
34 | Tabulation Form account for the weight of rubble riprap and
35 | have the signature of the Department representative.

- 1 | (b) Be sure when shown on the plans that concrete removed from
2 | an existing structure and paid for as Removal of Existing
3 | Structures is not paid for again as Rubble Riprap.
- 4 | (2) Sand-Cement: If proportioned by volume, the sand shall be
5 | measured loose in an approved measure prior to mixing with cement.
6 | If proportioned by weight, use 85 pounds per cubic foot or 1360
7 | kilograms per cubic meter for sand as a standard conversion factor.
- 8 | (a) When the pay quantity for sand-cement riprap is determined by
9 | volume of the sand, calculations from sketches and
10 | dimensions of the batch box capacity (or other approved
11 | measure) should be verified. These computations shall be
12 | recorded in a bound final measurement field book or
13 | appropriate Tabulation Form.
- 14 | (b) Computations along with sketches and dimensions shall be
15 | checked when weights are based on barge displacement. For
16 | a typical barge displacement calculation. ([See Figure No. 7-2](#))
- 17 | (c) Payment for riprap structures such as end walls and wing walls
18 | shall be limited to the **Roadway and Traffic Design Standard**
19 | **Index** volumes, as shown on the drawings, unless field
20 | changes in the dimension are authorized.
- 21 | (d) Refer to **Section 6.3.4, in the Preparation and**
22 | **Documentation Manual**, for form and preparation data.

23 | 7.2.3 Traffic Control Items

- 24 | (A) Guardrail and End Anchorage Assembly: This includes linear feet or linear
25 | meters of guardrail paid for as plan quantity end anchorage assemblies;
26 | special posts; terminal end sections; and bridge anchorage assemblies.
27 | When reviewing is required:
- 28 | (1) Verify that the final plans contain the STD used during construction of
29 | these items.
- 30 | (2) To reveal possible overlaps or omissions in pay quantities, if time
31 | permits and at the reviewer's option, use colored pencils to shade in
32 | areas checked on an 11" x 17" set of plans as the items are checked.
33 | Final Flight Aerial photos may also be used for this purpose.
34 | Eliminating overlaps or omissions is also done by a careful check of
35 | start and stop stations for each section to be paid.

- 1 (3) Confirm each run of guardrail by verifying the station-to-station
2 lengths shown in linear feet or linear meters plus field measured cut
3 off panels. Check the final measurement field book.
- 4 (4) Sections noted on the STD details as back rail shall not be considered
5 as double-faced guardrail.
- 6 (5) Compare final quantities with the summary of materials. Check the
7 Daily Report of Construction in questionable areas.
- 8 (6) Determine by actual count those items of additional payment used in
9 conjunction with the guardrail and paid for per each, i.e., terminal end
10 sections and anchorage assemblies.
- 11 (7) Quantities for Resetting Guardrail should be verified by checking the
12 final measurements from outside-to-outside of end anchorages with
13 the following exception. If in re-setting guardrail a new anchor is
14 constructed, then that terminal end is included in the price of the
15 anchor and will not be included in the final measurements for
16 Resetting Guardrail pay item.
- 17 (8) Resetting Salvageable Guardrail: New post, hardware, stand-off
18 blocks, or other new material required for resetting salvageable
19 guardrail are included in the unit price of Resetting Guardrail and shall
20 not be paid for separately.
- 21 (9) Resetting non-salvageable Guardrail: Where the **Article 538-5 of the**
22 **Specifications** call for new materials to be furnished to replace non
23 salvageable guardrail panels and posts, excluding items damaged by
24 the Contractor, the unit price per linear foot or linear meter for
25 Resetting Guardrail shall be adjusted based on 125% of invoice cost
26 for those materials including transportation charges.
- 27 (B) Fencing, Type 'A' and Type 'B': Quantities ~~checked~~ will be the plan quantity
28 linear foot or meters of each type of fence, the number of Corner Post
29 Assemblies, the number of Pull and End Post Assemblies, and extra length
30 post.
- (1) ~~Check Daily Report of Construction and other records for extra length~~
posts authorized. Post over 20 feet or 6.1 meters shall be paid for as
unforeseeable work (Article 550-6.3 of the Specifications).
- (2) ~~Check the STD for the maximum spacing of pull post, corner post,~~

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and end-post assemblies.

(3) Verify the numbers of each of the pull posts, corner posts, and end post assemblies actually installed using the final measurement book, final plans, and other field records.

(4) Payment for extra length posts requires an invoice from the Contractor. Compensation will be at invoice price plus 10 %.

Example: Contractor submits invoice for 20 extra length posts at a invoice price of \$250.00. An additional 10 percent = \$25.00. The compensation will be \$275.00 for the extra length posts. An adjusted fencing item will be shown with a quantity of one (1), at a unit price of \$275.00. Ensure the RO/Consultant submitted a copy of the invoice with the Final Estimate Package.

Check to see that payment for extra length posts is made by increasing the fencing quantity based on the payment rates shown in the table per **Article 550-6.3 of the Specifications**.

For Example: Where twenty three (23) 8' steel posts are included in the \$5.00 per linear foot fencing price and twenty three (23) 12' posts must be used, then the extra length of fence post must be paid for at 50% of the linear foot fencing unit price. This cost is calculated as follows, the (extra length of fence post) X (50% X Unit Price) equals the additional payment for fence posts in excess of standard length.

$(12' - 8') \text{ extra length} \times (23) \text{ extra length posts} \times (.50 \times \$5.00) = \$230$

The \$230 payment for length in excess of the standard length is made by increasing the fencing quantity to produce an equivalent payment.

$\$230 / \$5.00 \text{ per LF} = 46 \text{ LF}$ of additional fence quantity to cover the costs of extra length posts.

(5) Gates, are to be paid as each. Location and summary needs to be provided to document quantity(s). special fencing, resetting existing fence, and cattle guards should be covered by special provisions when included in the contract.

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1 | **7.2.4 Erosion Control Items**

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2 | (A) Seeding or Seeding and Mulching: Pay item quantities that should be
3 | reviewed:

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4 | (1) Area quantities, in square yards or square meters shall be verified as
5 | indicated on the final plans. Station-to-station lengths and widths
6 | used to calculate the areas shall reflect the actual surface area of the
7 | finished work.

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8 | (a) Do not deduct for areas occupied by turnouts in rural sections.

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9 | (b) All latitude and departure calculations and/or computer
10 | processed area calculations shall be reviewed for obvious
11 | errors, overlaps, or omissions.

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12 | (c) Check that similar item areas like sodding or sprigging are not
13 | included for duplicate pay.

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14 | (2) Grass seed (pounds or kilograms) shall be documented on a
15 | appropriate Tabulation Form. Verify the quantity used by checking
16 | these records. Check plan notes, etc, for grass seed type and rate of
17 | application. Check rate of application actually achieved.

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18 | (3) Mulch material used shall be verified by checking the appropriate
19 | Tabulation Forms. Check input and output for errors, if the
20 | Department's Engineering Quantities Program was used to tabulate
21 | quantities. Check yields. Check the gross, tare, and net weights for
22 | each load. The Reviewer shall also verify the type of material and the
23 | signature of the inspector who observed the weighing.

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24 | (4) Fertilizer and Dolomitic Limestone quantities shall be checked using
25 | the appropriate Tabulation Forms or certified weight tickets for bulk
26 | materials.

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27 | (a) Detached bag tags are not permanent source records. They
28 | may be used as a backup for the appropriate Tabulation Forms
29 | and they need not be submitted with the final estimate.

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30 | (b) When Tabulation Forms are summarized using the
31 | Department's Engineering Quantities Program, all keypunching
32 | and output should be reviewed for errors.

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- 1 | (c) These items shall not be paid for again when regrassing is required except as allowed by the PE in accordance with **Article 570-4 of the Specifications.** Formatted: Don't suppress line numbers
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- 4 | (5) Water: The final quantities should be carefully checked and the source records verified as follows: Formatted: Don't suppress line numbers
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- 6 | (a) The quantities are measured, at the time they are applied, by means of an approved metering device or by measurement in a calibrated tank. Formatted: Don't suppress line numbers
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- 9 | (b) The gallons or liters applied shall be recorded on the appropriate Tabulation Forms. The date, job Financial Project ID, truck number, meter reading, and/or gallons or liters shall be recorded on each delivery as it is applied. Formatted: Don't suppress line numbers
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- 12 |
- 13 | (c) Verify that there are not any overlaps or gaps on meter readings that are not fully explained. Formatted: Don't suppress line numbers
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- 15 | (d) Meters shall be certified and sealed. If meters are cleaned or repaired they shall be reset to zero, a note put in the records, and a new ticket begun for future metering. Formatted: Don't suppress line numbers
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- 18 | (e) Be sure the inspector who reads and records the water meter has determined and noted in the final records the units, i.e., units of ten (10) gallons or liters or hundred (100) gallons or liters. Formatted: Don't suppress line numbers
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- 22 | (f) Verify that the actual figures displayed on the meter have been recorded and that no zeros have been added to the readings. Formatted: Don't suppress line numbers
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- 24 | (g) Use the units pertinent to each meter reading (10 gallons or liters or 100 gallons or liters) to convert to total gallons or liters on a per tabulation form basis. Formatted: Don't suppress line numbers
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- 27 | (h) Check the summary of quantities manually or by computer and the final conversion to units of pay, i.e., 1000 gallon or 1000 liter. Formatted: Don't suppress line numbers
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- 30 | (i) The Daily Report of Construction and other records should be reviewed for compatibility with total quantity of water applied up until the time of acceptance of the work. Formatted: Don't suppress line numbers
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- 32 |
- 33 | (6) The final quantities for Seeding, Mulching, Fertilizer, and similar items Formatted: Don't suppress line numbers

1 are accepted by the DFEO as authorized and submitted by project
2 personnel providing:

3 | (a) Materials are applied in the areas shown in the plans or
4 authorized by the PE.

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5 | (b) The rates of application used are no greater than those shown
6 in the plans, Standard Specifications, special provisions, or
7 authorized by the PE.

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8 | (c) All backup site source records are submitted to support the
9 calculated quantities.

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10 | (B) Sodding: Sodding areas should be checked for overlaps and/or omissions
11 with regard to sodding or grassing items of work.

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12 | (1) When finding overlaps or omissions in pay, these areas should be
13 clearly delineated by drawing a cloud around the effected area and
14 denoting with an explanation on an 11" x 17" set of plans as the item
15 is checked. Final Flight Aerial photos may also be used for this
16 purpose. Eliminating overlaps or omissions may also be done by a
17 careful check of the start and stop stations and widths for each
18 section to be paid.

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19 | (2) Computer run quantities should be carefully checked to ensure that
20 areas such as paved flumes, bridges, slope paving, etc., have not
21 been included. Aerial photos may be utilized.

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22 | (C) Matting: Matting erosions control shall be reviewed in accordance with the
23 foregoing procedures. No deductions for inlets, catch basins, etc. shall be
24 made.

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25 | **7.3 LIST OF FIGURES FOLLOWING THIS CHAPTER**

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26 | Figure No. 7-1 Sample Calculation of Toe Wall Example
27 | Figure No. 7-2 Typical Barge Displacement Form Example

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