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

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7.1 PURPOSE

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

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7.2 PROCEDURE

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7.2.1 Curb, Traffic Separator, and Barrier Wall

22 All items in this section are normally to be paid as plan quantity, subject to **Article 9-**
23 **3 of the Specifications**. ~~If reviewing is required, spot-check as follows:~~

24 (A) Concrete Curb and Gutter: The items to be reviewed using these
25 procedures are the various types of curbs and gutters constructed in
26 conformity with the lines, grades, dimensions, and notes shown in the plans.

27 ~~(1) The length of curb or curb and gutter should be checked by~~
28 ~~calculating the difference in station values as noted on the plans.~~
29 ~~This is usually done block by block in municipal areas. Pay special~~
30 ~~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.~~

- 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 standards,~~
28 ~~inlets, etc., that encroach into the barrier wall.~~
- 29 NOTE: Plan Quantity will not be final measured. Only Field Changes and/or plan errors
30 are to be measured/documented in a ~~Non-standard f~~Field ~~b~~Book, matrix, and or in
31 the plans.

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2 **7.2.2 Miscellaneous Concrete Paving Items**

3 (A) Concrete Sidewalk: The quantity to be paid for shall be the plan quantity in
4 place completed and accepted per **Article 9-3 of the Specifications**. When
5 reviewing is required:

6 (1) No deductions shall be made for the area occupied by ornamental
7 trees, manholes, inlets, drainage structure, or public utility
8 appurtenances within the normal sidewalk area.

9 (2) All steel reinforcement required shall be included in the costs of the
10 concrete sidewalk.

11 ~~(3) Verify plan lengths by station-to-station dimensions, final chained
12 measurements, or a combination of both. Check for equations.~~

13 ~~(4) To reveal possible overlaps or omissions in pay quantities, if time
14 permits and at the reviewer's option, use colored pencils to shade in
15 areas checked on an 11" x 17" set of plans as the items are checked.
16 Final Flight Aerial photos may also be used for this purpose.
17 Eliminating overlaps or omissions may also be done by a careful
18 check of the start and stop stations and widths for each section to be
19 paid.~~

20 ~~(35)~~ Confirm that all sections removed and replaced through no fault of the
21 Contractor have been properly noted and that the Contractor has
22 been paid for their removal and replacement.

23 ~~(64)~~ Ensure that different shapes and thickness have been properly coded,
24 calculate areas.

25 ~~(7) Special concrete sidewalk as specified in the special provisions shall
26 be measured per linear foot or linear meter.~~

27 ~~(8) Concrete traffic islands shall be considered, measured, and paid for
28 per square yard or square meter as concrete sidewalk, excluding the
29 area paid for as curb and/or curb and gutter.~~

30 ~~(59)~~ Note that any required excavation for the sidewalk shall be paid for
under the items for the grading work.

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

1 ton, in surface-dry natural state by railroad scales, truck scales, or
2 barge displacement. For a typical barge displacement calculation
3 ([See Figure No. 7-2](#))

4 (a) Verify that the certified weight tickets and/or appropriate
5 Tabulation Form account for the weight of rubble riprap and
6 have the signature of the Department representative.

7 (b) Be sure when shown on the plans that concrete removed from
8 an existing structure and paid for as Removal of Existing
9 Structures is not paid for again as Rubble Riprap.

10 (2) Sand-Cement: If proportioned by volume, the sand shall be
11 measured loose in an approved measure prior to mixing with cement.
12 If proportioned by weight, use 85 pounds per cubic foot or 1360
13 kilograms per cubic meter for sand as a standard conversion factor.

14 (a) When the pay quantity for sand-cement riprap is determined by
15 volume of the sand, calculations from sketches and
16 dimensions of the batch box capacity (or other approved
17 measure) should be verified. These computations shall be
18 recorded in a bound final measurement [non-standard](#) field
19 book or appropriate Tabulation Form.

20 (b) Computations along with sketches and dimensions shall be
21 checked when weights are based on barge displacement. For
22 a typical barge displacement calculation. ([See Figure No. 7-2](#))

23 (c) Payment for riprap structures such as end walls and wing walls
24 shall be limited to the **Roadway and Traffic Design Standard**
25 **Index** volumes, as shown on the drawings, unless field
26 changes in the dimension are authorized.

27 (d) Refer to **Section 6.3.43**, in the **Preparation and**
28 **Documentation Manual**, for form and preparation data.

29 7.2.3 Traffic Control Items

30 (A) Guardrail and End Anchorage Assembly: This includes linear feet or linear
31 meters of guardrail paid for as plan quantity end anchorage assemblies;
32 special posts; terminal end sections; and bridge anchorage assemblies.
33 When reviewing is required:

- 1 (1) Verify that the final plans contain the STD used during construction of
2 these items.
- 3 ~~(2) To reveal possible overlaps or omissions in pay quantities, if time~~
4 ~~permits and at the reviewer's option, use colored pencils to shade in~~
5 ~~areas checked on an 11" x 17" set of plans as the items are checked.~~
6 ~~Final Flight Aerial photos may also be used for this purpose.~~
7 ~~Eliminating overlaps or omissions is also done by a careful check of~~
8 ~~start and stop stations for each section to be paid.~~
- 9 ~~(3) Confirm each run of guardrail by verifying the station-to-station~~
10 ~~lengths shown in linear feet or linear meters plus field measured cut~~
11 ~~off panels. Check the final measurement Non-standard field book.~~
- 12 ~~(4) Sections noted on the STD details as back rail shall not be considered~~
13 ~~as double-faced guardrail.~~
- 14 ~~(5) Compare final quantities with the summary of materials. Check the~~
15 ~~Daily Report of Construction in questionable areas.~~
- 16 (26) Determine by actual count those items of additional payment used in
17 conjunction with the guardrail and paid for per each, i.e., terminal end
18 sections and anchorage assemblies.
- 19 ~~(7) Quantities for Resetting Guardrail should be verified by checking the~~
20 ~~final measurements from outside-to-outside of end anchorages with~~
21 ~~the following exception. If in re-setting guardrail a new anchor is~~
22 ~~constructed, then that terminal end is included in the price of the~~
23 ~~anchor and will not be included in the final measurements for~~
24 ~~Resetting Guardrail pay item.~~
- 25 (38) Resetting Salvageable Guardrail: New post, hardware, stand-off
26 blocks, or other new material required for resetting salvageable
27 guardrail are included in the unit price of Resetting Guardrail and shall
28 not be paid for separately.
- 29 (49) Resetting non-salvageable Guardrail: Where the **Article 538-5 of the**
30 **Specifications** call for new materials to be furnished to replace non
31 salvageable guardrail panels and posts, excluding items damaged by
32 the Contractor, the unit price per linear foot or linear meter for
33 Resetting Guardrail shall be adjusted based on 125% of invoice cost
34 for those materials including transportation charges.

- 1 (B) Fencing, Type 'A' and Type 'B': Quantities will be the plan quantity of each
2 type of fence,
3 Payment for extra length posts requires an invoice from the Contractor.
4 Compensation will be at invoice price plus 10 %.

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

11 Gates are to be paid as each. Location and summary needs to be
12 provided to document quantity(s).

13 7.2.4 Erosion Control Items

14 (A) ~~Seeding or Seeding and Mulching~~ Performance Turf: ~~Pay item quantities that~~
15 ~~should be reviewed: Per Section 570-8 of the Specification, the Method of~~
16 ~~Measurement for Performance Turf will be Plan Quantity in square yards based on the~~
17 ~~area shown in the plans, completed and accepted. Prices and payments will be full~~
18 ~~compensation for all work and materials specified in this Section.~~

20 ~~(1) Area quantities, in square yards or square meters shall be verified as~~
21 ~~indicated on the final plans. Station-to-station lengths and widths~~
22 ~~used to calculate the areas shall reflect the actual surface area of the~~
23 ~~finished work.~~

24 ~~(a) Do not deduct for areas occupied by turnouts in rural sections.~~

25 ~~(b) All latitude and departure calculations and/or computer~~
26 ~~processed area calculations shall be reviewed for obvious~~
27 ~~errors, overlaps, or omissions.~~

28 ~~(c) Check that similar item areas like sodding or sprigging are not~~
29 ~~included for duplicate pay.~~

30 ~~(2) Grass seed (pounds or kilograms) shall be documented on a~~
31 ~~appropriate Tabulation Form. Verify the quantity used by checking~~
32 ~~these records. Check plan notes, etc, for grass seed type and rate of~~
33 ~~application. Check rate of application actually achieved.~~

- 1 (3) ~~Mulch material used shall be verified by checking the appropriate~~
2 ~~Tabulation Forms. Check input and output for errors, if the~~
3 ~~Department's Engineering Quantities Program was used to tabulate~~
4 ~~quantities. Check yields. Check the gross, tare, and net weights for~~
5 ~~each load. The Reviewer shall also verify the type of material and the~~
6 ~~signature of the inspector who observed the weighing.~~
- 7 (4) ~~Fertilizer and Dolomitic Limestone quantities shall be checked using~~
8 ~~the appropriate Tabulation Forms or certified weight tickets for bulk~~
9 ~~materials.~~
- 10 ~~(a) Detached bag tags are not permanent source records. They~~
11 ~~may be used as a backup for the appropriate Tabulation Forms~~
12 ~~and they need not be submitted with the final estimate.~~
- 13 ~~(b) When Tabulation Forms are summarized using the~~
14 ~~Department's Engineering Quantities Program, all keypunching~~
15 ~~and output should be reviewed for errors.~~
- 16 ~~(c) These items shall not be paid for again when regrassing is~~
17 ~~required except as allowed by the PE in accordance with~~
18 ~~**Article 570-4 of the Specifications.**~~
- 19 (5) ~~Water: The final quantities should be carefully checked and the~~
20 ~~source records verified as follows:~~
- 21 ~~(a) The quantities are measured, at the time they are applied, by~~
22 ~~means of an approved metering device or by measurement in~~
23 ~~a calibrated tank.~~
- 24 ~~(b) The gallons or liters applied shall be recorded on the~~
25 ~~appropriate Tabulation Forms. The date, job Financial Project~~
26 ~~ID, truck number, meter reading, and/or gallons or liters shall~~
27 ~~be recorded on each delivery as it is applied.~~
- 28 ~~(c) Verify that there are not any overlaps or gaps on meter~~
29 ~~readings that are not fully explained.~~
- 30 ~~(d) Meters shall be certified and sealed. If meters are cleaned or~~
31 ~~repaired they shall be reset to zero, a note put in the records,~~
32 ~~and a new ticket begun for future metering.~~

- 1 ~~(e) — Be sure the inspector who reads and records the water meter~~
2 ~~has determined and noted in the final records the units, i.e.,~~
3 ~~units of ten (10) gallons or liters or hundred (100) gallons or~~
4 ~~liters.~~
- 5 ~~(f) — Verify that the actual figures displayed on the meter have been~~
6 ~~recorded and that no zeros have been added to the readings.~~
- 7 ~~(g) — Use the units pertinent to each meter reading (10 gallons or~~
8 ~~liters or 100 gallons or liters) to convert to total gallons or liters~~
9 ~~on a per tabulation form basis.~~
- 10 ~~(h) — Check the summary of quantities manually or by computer~~
11 ~~and the final conversion to units of pay, i.e., 1000 gallon or~~
12 ~~1000 liter.~~
- 13 ~~(i) — The **Daily Report of Construction (Form No. 700-050-13)**~~
14 ~~and other records should be reviewed for compatibility with~~
15 ~~total quantity of water applied up until the time of acceptance~~
16 ~~of the work.~~
- 17 ~~(6) — The final quantities for Seeding, Mulching, Fertilizer~~
18 ~~Performance Turf, and similar items are accepted by the DFEO as authorized and~~
19 ~~submitted by project personnel providing:~~
- 20 ~~(a) — Materials are applied in the areas shown in the plans or~~
21 ~~authorized by the PE.~~
- 22 ~~(b) — The rates of application used are no greater than those shown~~
23 ~~in the plans, Standard Specifications, special provisions, or~~
24 ~~authorized by the PE.~~
- 25 ~~(c) — All backup site source records are submitted to support the~~
26 ~~calculated quantities.~~
- 27 ~~(B) — Performance Turf Sodding: Performance Turf Sodding areas should be~~
28 ~~checked for overlaps and/or omissions with regard to sodding or grassing~~
29 ~~items of work.~~
- 30 ~~(1) — When finding overlaps or omissions in pay, these areas should be~~
31 ~~clearly delineated by drawing a cloud around the effected area and~~
32 ~~denoting with an explanation on an 11" x 17" set of plans as the item~~
33 ~~is checked. Final Flight Aerial photos may also be used for this~~

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~~purpose. Eliminating overlaps or omissions may also be done by a careful check of the start and stop stations and widths for each section to be paid.~~

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

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

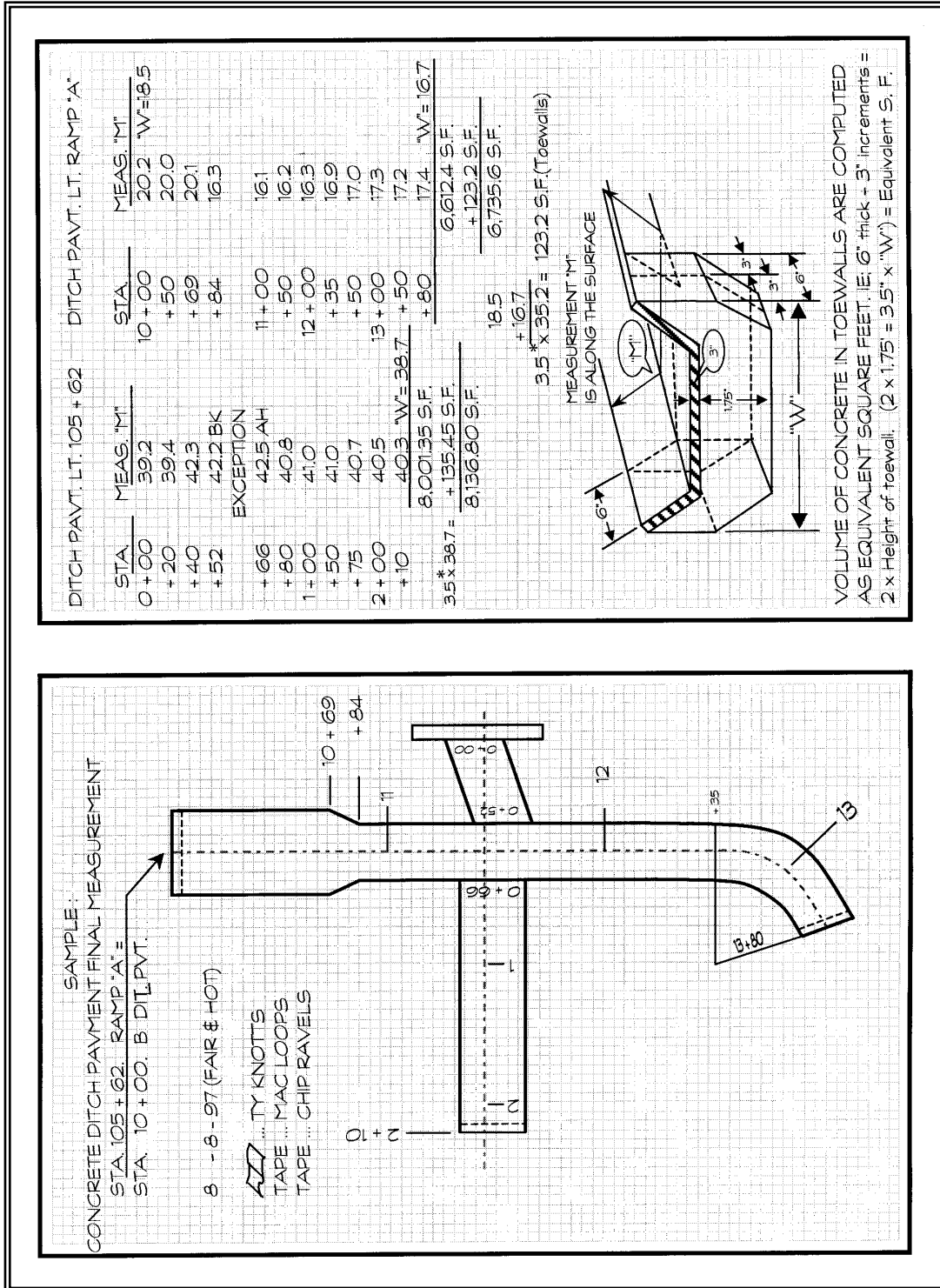
11 7.3 LIST OF FIGURES FOLLOWING THIS CHAPTER

- 12 Figure No. 7-1 Sample Calculation of Toe Wall Example
13 Figure No. 7-2 Typical Barge Displacement Form Example

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Figure 7-1
EXAMPLE CALCULATIONS OF TOE WALL

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Figure 7-2
EXAMPLE OF TYPICAL BARGE DISPLACEMENT FORM

