April 01, 2003

TO: 2002 ROADWAY DESIGN MANUAL HOLDERS

FROM: VICTOR BARBOUR, P. E.
STATE DESIGN SERVICES ENGINEER

SUBJECT: REVISED AND NEW GUIDELINES FOR THE 2002 ROADWAY DESIGN MANUAL

EFFECTIVE DATE: April 01, 2003

The following are The Revisions and New Guidelines to Part I and Part II of the Roadway Design Manual. Please insert these Revisions in your Manual in the appropriate place. These Revisions are to become effective immediately. The 2002 Roadway Design Manual on the web site has already been updated.

REVISION NO. 2

Part I - Roadway Design Manual

1. Chapter 1 - Section 4-O  NCDOT Paved Shoulder Policy

NOTE: Adjustments have been made in the Freeway section to allow for 10' full depth paved shoulders for 40,000 ADT or greater. Freeway projects with less than 40,000 ADT, but greater than or equal to 15,000 ADT will have 10-foot paved outside shoulders, but only 4-foot will be full depth with the remaining 6-foot to be partial depth. Freeways with design year traffic less than 15,000 ADT will have 4-foot wide full depth outside paved shoulders. The median paved shoulder will remain 4-foot wide and be full depth. 12' paved shoulders for freeways with heavy truck traffic is also addressed.
1. Chapter 6 - Section 5, Figure 2. Bridge Superstructure Depths

    NOTE: Changes to Structure depths, to comply with Roadway Design.

2. Chapter 9 - Section 1, Figure 3A Sheets 2 to 5. Deceleration Lengths for Median Crossovers and Left Turning Movements

    NOTE: Changed last sentence from Bus design to Passenger Vehicle to match Part 1, section 6-D.

3. Chapter 11 - Section 1D, Subgrade Stabilization

    NOTE: Subgrade Stabilization added from Part II, Chapter 6, section 1-E.

**Part II - Roadway Design Manual**

4. Chapter 6 - Section 1-E, Subgrade Stabilization

    NOTE: Subgrade Stabilization removed and placed in Part I, Chapter 11, section 1-D.

5. Chapter 19 - Section 3, Earthwork Balance Sheet

    NOTE: Revised Earthwork Balance Sheet and Descriptions.

If you have any questions/comments about this revision or suggestions concerning the Roadway Design Manual, Please contact Robert McKeithan (rmckeithan@dot.state.nc.us) or Robert Prince (rprince@dot.state.nc.us) of the Special Services Group, Design Services Unit at (919) 250-4128.

Attachment
### NC DOT Paved Shoulder Policy

<table>
<thead>
<tr>
<th>ROADWAY DESIGN MANUAL PART I</th>
<th>REV. DATE : 04/01/03</th>
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<tbody>
<tr>
<td><strong>INTERSTATE AND FREEWAYS</strong></td>
<td><strong>10' WIDE PAVED OUTSIDE SHOULDERS &amp; 10' WIDE PAVED MEDIAN SHOULDERS (FULL DEPTH OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT).</strong></td>
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<tr>
<td>6 OR MORE LANES</td>
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<tr>
<td><strong>INTERSTATE 4 LANES</strong></td>
<td><strong>10' WIDE PAVED OUTSIDE SHOULDERS (FULL DEPTH OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT) AND 4' WIDE FULL DEPTH PAVED MEDIAN SHOULDERS (REMAINING WIDTH TO BE TURF).</strong></td>
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<td>(DES. YR. ADT ≥ 40000)</td>
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<tr>
<td>(DES. YR. ADT &lt; 40000)</td>
<td><strong>10' WIDE PAVED OUTSIDE SHOULDERS (4' OF WIDTH TO BE FULL DEPTH, REMAINING PAVED WIDTH TO BE SURFACE COURSE ON ABC, OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT) 4' WIDE FULL DEPTH PAVED MEDIAN SHOULDERS (REMAINING WIDTH TO BE TURF).</strong></td>
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<tr>
<td>(DES. YR. ADT &lt; 15000)</td>
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<tr>
<td>(DES. YR. ADT &lt; 15000)</td>
<td><strong>4' WIDE OUTSIDE AND 4' WIDE MEDIAN FULL DEPTH PAVED SHOULDERS (REMAINING SHOULDER WIDTH TO BE TURF).</strong></td>
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#### DIVIDED:

| ARTERIALS, COLLECTORS      | **10' WIDE PAVED OUTSIDE SHOULDERS (4' OF WIDTH TO BE FULL DEPTH, REMAINING PAVED WIDTH TO BE SURFACE COURSE ON ABC OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT) 4' WIDE FULL DEPTH MEDIAN SHOULDER. SEE NOTE 7.** |
| 6 OR MORE LANES            |                      |
| (DES. YR. ADT ≥ 40000)     |                      |
| (DES. YR. ADT < 40000)     | **10' WIDE PAVED OUTSIDE SHOULDERS (4' OF WIDTH TO BE FULL DEPTH, REMAINING PAVED WIDTH TO BE SURFACE COURSE ON ABC OR AS DIRECTED BY PAVEMENT MANAGEMENT.) 4' WIDE FULL DEPTH PAVED MEDIAN SHOULDERS (REMAINING MEDIAN SHOULDER WIDTH TO BE TURF).** |
| (DES. YR. ADT < 40000)     |                      |
| (DES. YR. ADT < 15000)     | **4' WIDE OUTSIDE & 2' WIDE MEDIAN FULL DEPTH PAVED SHOULDERS. (REMAINING SHOULDER WIDTH TO BE TURF).** |

#### MULTILANE UNDIVIDED:

| 4 OR MORE LANES            | **10' WIDE PAVED SHOULDERs (4' OF WIDTH TO BE FULL DEPTH, REMAINING PAVED WIDTH TO BE SURFACE COURSE ON ABC, OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT).** |
| (DES. YR. ADT ≥ 40000)     |                      |
| (DES. YR. ADT < 40000)     | **10' WIDE PAVED SHOULDERs (4' OF WIDTH TO BE FULL DEPTH, REMAINING PAVED WIDTH TO BE SURFACE COURSE ON ABC, OR AS DIRECTED BY THE PAVEMENT MANAGEMENT UNIT).** |

#### TWO LANE - TWO WAY:

| 4 OR MORE LANES            | **4' WIDE FULL DEPTH PAVED SHOULDERS. (REMAINING SHOULDER WIDTH TO BE TURF).** |
| (DES. YR. ADT ≥ 8000)      |                      |
| (DES. YR. ADT ≥ 4000)      | **2' WIDE FULL DEPTH PAVED SHOULDERS. (REMAINING SHOULDER WIDTH TO BE TURF).** |
| (DES. YR. ADT < 4000)      | **FULL SHOULDER TO BE TURF. NOTE: 4' PAVED SHOULDER MAY BE CONSIDERED FOR BIKE ROUTES.** |

#### RAMPS

| LEFT SHOULDERS             | **4' WIDE FULL DEPTH PAVED SHOULDER (REMAINING SHOULDER WIDTH TO BE TURF).** |
| RIGHT SHOULDERS            | **4' WIDE FULL DEPTH PAVED SHOULDER (REMAINING SHOULDER WIDTH TO BE TURF).** |

**NOTES:**

1. Paved shoulder width should not exceed usable widths as defined in Roadway Design Manual except at guardrail locations as shown in Std. 822.01.
2. A 12' wide paved outside shoulder should be considered for Interstate and Freeways having truck traffic which exceeds 2500 cph.
3. Paved shoulder widths of 12' should be considered for these facilities having truck traffic which exceed 2500 cph.
4. No shoulders of 12' or more should be provided on any freeway that has a speed limit of 70 mph or higher.
5. The pavement management unit shall determine the paved shoulder design on a project by project basis.
6. The full usable shoulder width of individual ramps may be added if a history of excessive shoulder usage is apparent or expected based upon experience at similar facilities in the region. If the full usable width is to be paved, then 4' of the width shall be full depth pavement and the remaining paved width shall be surface course on ABC as directed by the pavement management unit.
7. The full usable shoulder width of individual ramps may be added if the adjacent lane connects to interchanges where the full usable shoulder width can be added at the project field inspection and is to be approved by the State Roadway Design Engineer.
8. Consider 10' paved median shoulders for speeds: 55 mph.
FIGURE 2

BRIDGE SUPERSTRUCTURE DEPTHS
-PLATE GIRDER SUPERSTRUCTURE-

THE DEPTHS LISTED BELOW ARE BASED ON THE FOLLOWING PARAMETERS, AND IF CONDITIONS DO NOT APPEAR TO MEET THESE NORMS, IT WILL BE NECESSARY TO DISCUSS THE SUPERSTRUCTURE DEPTH WITH THE STRUCTURE DESIGN UNIT.

PARAMETERS
(a) 34', 40', 48', 56', OR 64' ROADWAY WIDTH
(b) HS 20 LIVE LOAD
(c) SIMPLE SPAN, COMPOSITE TYPE GIRDER
(d) ASTM 588 UNPAINTED HIGH STRENGTH STEEL
(e) STAY IN PLACE METAL FORMS
(f) NO TRANSVERSE STIFFENERS
(g) CONCRETE BARRIER RAILS

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<tr>
<th>DESIGN SPAN (ft.)</th>
<th>SUPERSTRUCTURE DEPTH (ft.)*</th>
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<tr>
<td>39' - 0&quot; to 45' - 0&quot;</td>
<td>4' - 0&quot;</td>
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<tr>
<td>&gt; 45' - 0&quot; to 65' - 0&quot;</td>
<td>4' - 8&quot;</td>
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<tr>
<td>&gt; 65' - 0&quot; to 90' - 0&quot;</td>
<td>5' - 5&quot;</td>
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<td>&gt; 90' - 0&quot; to 105' - 0&quot;</td>
<td>6' - 3&quot;</td>
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<tr>
<td>&gt; 105' - 0&quot; to 120' - 0&quot;</td>
<td>6' - 11&quot;</td>
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<tr>
<td>&gt; 120' - 0&quot; to 150' - 0&quot;</td>
<td>7' - 3&quot;</td>
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<tr>
<td>&gt; 150' - 0&quot; to 160' - 0&quot;</td>
<td>7' - 7&quot;</td>
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<tr>
<td>&gt; 160' - 0&quot;</td>
<td>Consult with SDU</td>
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* DEPTHS SHOWN ARE FROM TOP OF SLAB DIRECTLY OVER EXTERIOR GIRDER TO BOTTOM OF DEFLECTED GIRDER. THE SUPERSTRUCTURE DEPTH MUST BE ADJUSTED FOR CROWN DROP. THESE DEPTHS ARE BASED ON SIMPLE SPAN GIRDERs. DEPTHS FOR CURVED GIRDERs OR CONTINUOUS GIRDERs SHOULD BE COORDINATED WITH STRUCTURE DESIGN.

* FOR SPAN LENGTH UP TO 160 ft., ADEQUATE VERTICAL CLEARANCE SHOULD HAVE BEEN PROVIDED TO ALLOW FLEXIBILITY IN SELECTING THE TYPE OF SUPERSTRUCTURE.
FIGURE 3A

GUIDELINES FOR OFFSETTING OPPPOSING
LEFT-TURN LANES ON DIVIDED ROADWAYS

30' Median (+6' Offset)

INSET A

Painted Median
Monolithic Island

4-legged intersection

SEE DETAIL B

T-type intersection

*Note:
A 4 degree skew angle will provide approximately 340' of deceleration lengths for design speeds up to 40 mph. A parallel deceleration lane can be incorporated for design speeds 50 mph and higher or where additional storage length is required. See Detail B

Design U-turns for passenger vehicles unless project information dictates otherwise.

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FIGURE 3-A

GUIDELINES FOR OFFSETTING OPPOSING LEFT-TURN Lanes ON DIVIDED ROADWAYS

20' Median (+0' Offset)

"L" = radius widening for U-turn

INSET A

25' MINIMUM

Painted Median
Monolithic Island

4-legged intersection

"L" = U-Turn Bulb

SEE DETAIL B

25' MINIMUM

radius widening for U-turn

T-type intersection

INSET A

10' MIN.

12'

DETAIL B

100'

"L" =

*Note:
A 4 degree skew angle will provide approximately 230' of deceleration lengths for design speeds up to 30 mph. A parallel deceleration lane can be incorporated for design speeds 40 mph and higher or where additional storage length is required. See Detail B.

Design U-turns for passenger vehicles unless project information dictates otherwise.

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GUIDELINES FOR OFFSETTING OPPOSING LEFT-TURN LANES ON DIVIDED ROADWAYS

36' Median (+6' Offset)

"L" width
radius widening for U-turn

INSET A

25' MINIMUM
36'
10' MIN.

Painted Median
* Monolithic Island

4-legged intersection

U-Turn Bulb

SEE DETAIL B

25' MINIMUM
36'
10' MIN.

radius widening for U-turn

T-type intersection

INSET A

DETAIL B

*L* = 100'

*Note:
A 4 degree skew angle will provide approximately 385' of deceleration lengths for design speeds up to 40 mph. A parallel deceleration lane can be incorporated for design speeds 50 mph and higher or where additional storage length is required. See Detail B

Design U-turns for passenger vehicles unless project information dictates otherwise.
FIGURE 3-A

GUIDELINES FOR OFFSETTING OPPOSING LEFT-TURN LANES ON DIVIDED ROADWAYS

46' Median (+6' Offset)

INSET A

radius widening for U-turn

25' MINIMUM

25' MINIMUM

Painted Median
Monolithic Island

4-legged intersection

U-Turn Bulb

SEE DETAIL B

T-type intersection

radius widening for U-turn

"L"

14'

12'

20'

INSET A

DETAIL B

"L"

100'

*Note:
A 4 degree skew angle will provide approximately 455' of deceleration lengths for design speeds up to 50 mph. A parallel deceleration lane can be incorporated for design speeds 60 mph and higher or where additional storage length is required. See Detail B.

Design U-turns for passenger vehicles unless project information dictates otherwise.
AGGREGATE BASE COURSE (ABC) 11-1B

When all calculations are completed and totaled, the following procedures shall be used in the computation of ABC quantities.

- 0 TO 1000 TONS OF ABC – ADD 10%
- 1001 TO 5000 TONS OF ABC – ADD 5%
- 5001 TONS OF ABC AND ABOVE – ROUND OFF TO NEXT 100 TONS

PRIME COAT 11-1C

Section 600 of the Standard Specifications For Roads and Structures states that prime coat will not be required unless called for on the plans and in the estimate.

Areas where prime coat should be included on a project are as follows:

1. On mainline and/or -Y- line paving areas when requested by Division Engineer, if approved by the Pavement Management Unit.

2. On any paving project (including detours and paved shoulders) when the bituminous concrete thickness is less than 2”.

3. In conjunction with 10’ paved shoulders, if the remainder of the shoulder is all ABC, this area should be primed at a rate of 0.5 gallons per Sq. Yd.

Areas to be primed are shown on the typical sections.

SUBGRADE STABILIZATION 11-1D

When stabilized Subgrade is specified in the Geotechnical Recommendations for Pavement Design, it shall be included in the Pavement Schedule and shall be shown on the applicable typical sections. (See Pavement Schedule in this manual, Part II, 6-ID, F-1.) The following widths shall be used for stabilization:

1. Width in curb and gutter sections - Edge of pavement to edge of pavement.
2. Width in shoulder sections - One foot outside the top edges of the full depth pavement structure. (Include full depth paved shoulders.)
3. Do not use stabilization on pavement widths less than six feet.
The most commonly recommended subgrade stabilization’s are as follows:

1. **Lime Stabilization** requires the pay item “Lime Treated Soil (Slurry Method),” “Lime Treated Soil (Quicklime),” or “Lime Treated Soil (Hydrated Lime).” Lime Stabilization also requires pay items “Lime for Lime Treated Soil,” “Asphalt Curing Seal,” and “Blotting Sand.” The blotting sand quantity is shown in the Geotechnical Recommendations for Pavement Design.

2. **Cement Stabilization** requires the pay items “Soil Cement Base,” “Portland Cement for Soil Cement Base,” “Asphalt Curing Seal” and “Blotting Sand.” The blotting sand quantity is shown in the Geotechnical Recommendations for Pavement Design.

3. **Aggregate Base Course for the Cement Area** requires the pay item “Aggregate for Soil Cement Base.” This pay item is only used when it is specified that a percentage of the cement stabilized area also requires aggregate base course.

4. **Aggregate for Aggregate Stabilization** recommendations requires the pay item “Stabilizer Aggregate.”

Deviations from the Geotechnical Recommendations for Pavement Design shall be documented by the Pavement Design Engineer in the Pavement Management Unit.
PAVEMENT SCHEDULE (continued)  6-1D

R3  8" x 6" Concrete Curb
R4  _____" x _____" Concrete Curb
R5  5" Monolithic Concrete Island (surface mounted)
R6  5" Monolithic Concrete Island (keyed in)
R7  3" Concrete Island Cover
R8  _____" Concrete Island Cover
S   4" Concrete Sidewalk
T   Earth Material
U   Existing Pavement
W   Variable Depth Asphalt Pavement (See Standard Wedging Detail Sheet No. _____)
X   Permeable Asphalt Drainage Course - Type P-_____
PLOTTING OF CROSS-SECTION SHEETS

For most projects, cross-sections are plotted on a horizontal and vertical scale of 1” = 10’. On mountainous projects with extremely high cuts and fills 1” = 20’ might be more practical. In all cases horizontal and vertical scales should be the same. Half-size plots are sent out with plans having over 30 cross-section sheets. Full-size plots are sent out on projects with 30 or less cross-section sheets. If the Division request full-size plots for stake out and construction purposes, these should be provided.

USE OF CADD FOR EARTHWORK

Most cross sections will be created from a DTM (Digital Terrain Model) originating from Location and Surveys Unit or the Photogrammetry Unit. Geopak can be utilized to plot existing cross-sections, and complete proposed templates and earthwork. (Refer to Geopak Reference Manuals for procedures.)

EARTHWORK BALANCE SHEET

An earthwork balance sheet is required in the project file. Furnish a copy to the Geotechnical Unit on projects with available subsurface plans. Adhere to the following guidelines when preparing the Earthwork Balance Sheet:

A. BREAKDOWN QUANTITIES AS FOLLOWS:

1. Summary points at every 3,000’ ±.
2. Summary points end/begin at each bridge (stream or grade separation).
3. Summary points end/begin near each major at-grade multi-lane intersection or at-grade railroad crossing.
4. Separate Y line, ramp, loop and other major construction items from mainline earthwork, but include in the respective summary.
5. On widening projects, respective summaries are provided for right and left side if the material cannot be hauled across traffic.
6. On existing divided facilities to be widened, respective summaries are provided for right side, left side and median widening if the material cannot be hauled across traffic.
7. Projects with complex construction phasing plans may require phasing of the summary points. Coordinate phasing with the Division and Traffic Engineering.
EARTHWORK BALANCE SHEET (continued) 19-3

B. Include recommendations from the Geotechnical Unit and/or the Soils and Foundation Section as follows:

1. Shrinkage Factor - Use the figure recommended by the Soils and Foundation Section when available.

2. Loss Due to Clearing and Grubbing - This volume is estimated for loss in cuts of up to one (1) foot in depth. Any loss in fills is included in the shrinkage factor.

3. Undercut Excavation - A recommendation for excavating benches at grade points and removing unsuitable material below subgrade. This normally should be wasted, but in certain conditions can be used in embankments.

4. Top Soil on Borrow Pits - On projects requiring borrow material, an additional 5% of the total borrow should be computed for replacing the top soil on the borrow pit.

5. Rock – “Hard Rock” is only shown on the Earthwork Balance Sheet. All rock on the project should be used in embankments before using suitable excavation and should be computed on a one-to-one basis unless recommendations specify otherwise.

The earthwork balance sheet, shown in Part II, 19-3, F-2, (with numbered columns) is for use with the descriptions below.

C. The information for a basic Earthwork Balance Sheet should be listed as follows:

1. List, in column one, the survey line reference and beginning station for each summary point.
2. Record, in column two, the ending station for each summary point.
3. Show, in column three, the volume of all material excavated between summary point stations (except material covered by other excavation pay items such as undercut excavation and drainage ditch excavation).
4. Column four contains volumes of "hard" rock that is excavated as a part of unclassified excavation.
5. Record, in column five, volumes of material excavated beneath the roadway subgrade.
6. Show, in column six, volumes of any unclassified excavation that is not suitable for roadway embankments.

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7. Column seven contains Unclassified Excavation (less "hard" rock) volumes that are suitable for constructing roadway embankments.

8. List the total embankment (include backfill for undercut) in column eight. This figure is the volume of all the different materials used (do not include shrinkage or swell factors).

9. Show, in column nine, the volume of embankment that is to be constructed from "hard" rock. Use the "hard" rock portion of unclassified excavation, before the earth, to construct embankments within each summary point.

10. Show, in column ten, the volume of embankment that is to be constructed from earth.

11. Column eleven reflects the actual volume of material needed to construct the embankment. A shrinkage factor must be applied to the earth portion and then the "hard" rock is added if applicable. Shrinkage and swell factors do not apply to "hard" rock unless specified by the Geotechnical Unit.

12. Column twelve shows the amount of borrow material needed to construct embankments after the suitable excavation (rock and earth) has been utilized within the summary points.

13. Any "hard" rock excavation not utilized in embankments must have the volume listed in column thirteen.

14. Record, in column fourteen, the volume of any suitable excavation (undercut or unclassified) not utilized in embankments. Exclude "hard" rock.

15. In column fifteen, record the volume of excavation (unclassified or undercut) that does not have the necessary properties to be used in embankments.

16. Column sixteen shows the summation of volumes recorded in columns thirteen, fourteen, and fifteen.

After the listing of the summary points is completed, a "TOTAL" is needed. Total each respective column, three through sixteen. Make earthwork adjustments after the "TOTAL" as follows:

1. "Loss due to clearing and grubbing" volumes, recommended by the Geotechnical Unit, are to be deducted from columns three and seven. This figure also needs to be deducted from columns fourteen and sixteen on waste projects or added to column twelve on borrow projects.

2. "Hard" rock waste, used to replace borrow, is to be added in column nine. It must be deducted from columns ten, twelve, thirteen and sixteen.
3. Another line of adjustment is needed to "Adjust for rock waste." The volume of rock used to replace borrow should have the shrinkage factor applied (example: a project with 20% shrinkage should have this volume multiplied by 0.20). This adjustment must be deducted from columns eleven and twelve because the shrinkage factor was applied to the material within the summary points, but hard rock is not subject to the shrinkage factor.

4. Any earth waste to replace borrow should be deducted from columns twelve, fourteen, and sixteen.

5. Borrow projects with graded shoulder sections require a line of adjustment with volumes for shoulder material shown in columns eight and ten. These volumes, increased by the shrinkage factor, should show in columns eleven and twelve. Curb and gutter or shoulder trench sections do not need to be included. Projects, with enough usable waste material to build the graded shoulder section, should have a separate pay item of "Shoulder Borrow" which reflects this volume. Do not cover shoulder borrow within the earthwork balance sheet. This should be shown at the bottom of the sheet (below the grand total of earthwork balance sheet items). Do not use the "Shoulder Borrow" pay item on projects with the "Borrow Excavation" pay item.

6. Additional undercut (undercut not shown on plans such as grade point undercut, contingency undercut, etc.) should have an earthwork adjustment line if other undercut is shown within the summary points. This volume is to show in columns five, eight, ten, fifteen and sixteen. List this volume in column fourteen (instead of fifteen) if undercut is suitable. Show this volume, increased by the shrinkage factor, in columns eleven and twelve. Projects with no undercut shown within the summary points can have this volume listed, as estimated undercut, at the bottom of the sheet (below the grand total of earthwork balance sheet items). Using this method should result in the undercut quantity shown on the earthwork summary and the quantity on the summary of quantities being identical.

Other adjustments (select borrow, rock swell, flyash, etc.) may be warranted on select projects. The method of including this information on the earthwork balance sheet can vary due to recommendation format.

Total each respective column, three through sixteen, after the above adjustments are complete. This will be the "Grand Totals" on waste projects and "Project Totals" on borrow projects. Borrow projects need an additional 5% added to the figure shown in column twelve of the "Project Totals" line. This is an "Estimated 5% for Replacing Topsoil on Borrow Pits" which must be included in the "Grand Total" of borrow projects.
"Say" quantities should be shown beneath the "Grand Totals" for any volumes shown in columns that require a pay item.

The “Earthwork Summary” shown in the Roadway Plans shall be restricted to information shown in columns one, two, three, five, eleven, twelve and sixteen of the Earthwork Balance Sheet (Part II, 19-3, F-2). Do not show the shrinkage factor in the embankment +% column (eleven) of the Earthwork Summary in the plans.

An example of the earthwork balance sheet for a “Borrow” project shows in Part II, 19-3, F-3. See Part II, 19-3, F-4 for an example showing a “Waste” project.

The Plan Review Section of the Design Services Unit will assist you at your request.

NOTE ON CROSS SECTIONS (EXCLUDING LUMP SUM GRADING PROJECTS) 19-4

The following note shall be shown on the first cross-section sheet:
Note: “Quantities are approximate only. The Resident Engineer will re-cross-section the work accurately when the project is staked out. These cross-section notes will be used in computing the final quantities for which the contractor will be paid.”

NOTE FOR LUMP SUM GRADING 19-5

The following note shall be shown on the first cross-section sheet, the Earthwork Summary, and the Pavement Removal Summary on Lump Sum Grading projects:

Note: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Shoulder Borrow, Fine Grading, Clearing and Grubbing, Breaking of Existing Pavement, and Removal of Existing Pavement will be paid for at the contract lump sum price for “Grading.”

For additional information, see Chapter 11 of the Policy and Procedure Manual.
### Figure 2

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REV. DATE: 04/01/03
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Loss due to clear. & grub.  | -5,000 |
Rock waste to repl. bor.   | 3,000  | -3,000  | -3,000  | -3,000  |
Adjust for rock waste      | -600   | -600   | -600   | -600   |
Earth waste to repl. bor.  | -40,400 | -40,400 | -40,400 | -40,400 |
Est. Shoulder Material     | 12,000 | 12,000 | 14,400 | 14,400 |
Additional Undercut        | 5,000  | 5,000  | 6,000  | 6,000  |
PROJECT TOTALS             | 175,000 | 15,000 | 15,000 | 15,000 | 145,000 | 232,000 | 15,000 | 197,000 | 251,400 | 91,400 | 30,000 | 30,000 |

Est. for repl. Topsoil on borrow pits | 4,570 |

GRAND TOTALS | 175,000 | 95,970 |

SAY | 175,500 | 96,500 |
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