COMPUTATIONS & SUB SUMMARIES

FED. RD. DIVISION	STATE	PROJECT	
2	OHIO		

18
313

LAKE COUNTY
LAK-2-16.49

U-329-(23)

STA. 770 + 62 TO STA. 773 + 36

T-71, 10" REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

TOTAL NET LENGTH AS PER S.R. 2
TYPICAL SECTIONS = 116.61 FT.
WIDTH OF 4 LANES @ 12 FT. = 48.00 FT.
116.61 x 48.00 ÷ 9 = 622 S.Y.

B-21, 3" WATERPROOFED AGGREGATE BASE COURSE

TOTAL NET LENGTH AS PER S.R. 2
TYPICAL SECTIONS PLUS 1 APPROACH
SLAB @ 25 FT. = 141.61 FT.
WIDTH 2 SHOULDERS @ 4 FT. = 8 FT.
WIDTH 2 SHOULDERS @ 10 FT. = 20 FT.
TOTAL WIDTH = 28 FT.
141.61 x 28.00 ÷ 9 = 440.56 S.Y.
440.56 x 3/36 = 37 C.Y.

B-112, POROUS BASE COURSE

TOTAL NET LENGTH AS PER B-21 = 141.61 FT.
AVERAGE END AREA = 13.833 SQ. FT.
141.61 x 13.833 ÷ 27 = 73 C.Y.

I-22, SUBBASE

TOTAL NET LENGTH = 141.61 FT.
AVERAGE END AREA = 37.478 SQ. FT.
141.61 x 37.478 ÷ 27 = 197 C.Y.

T-31, BITUMINOUS SURFACE TREATMENT

BITUMINOUS MATERIAL, ONE SEAL
OPERATION OF 0.25 GAL. PER S.Y OF B-21
AREA AS ABOVE = 440.56 S.Y.
440.56 x 0.25 = 110 GAL.

NO. 6 AGGREGATE APPLIED @ 0.008
C.Y. PER S.Y. OF B-21
440.56 x 0.008 = 4 C.Y.

E-1, COMPACTED SUBGRADE

AREA AS T-71 = 622 S.Y.
AREA AS B-21 = 441 S.Y.
AREA AS I-7 = 133 S.Y.
TOTAL = 1,196 S.Y.

S.S. CE-101.04 COMPACTION, USING A HEAVY PNUEMATIC TIRED ROLLER

S.Y./2,000 = 1196/2,000 = 0.6 HOURS

L-9 SEEDING & PROTECTING

STA. 770 + 62 TO STA. 772 + 52 1,149 S.Y.
TOTAL 1,149 S.Y.

L-9 COMMERCIAL FERTILIZER TONS = S.F. x 20 / 1000 x 2000

1,209 x 9 x 20 / 1,000 x 2,000 = 0.108 TONS
SEEDING + SODDING = 1209

L-9 AGRICULTURAL LIMING MATERIAL TONS = S.F. x 100 / 1000 x 2000

1,209 x 9 x 100 / 1,000 x 2,000 = 0.544 TONS

EARTHWORK

SHEET NO.	STATION FROM	STATION TO	E-1 ROADWAY EXC. CU. YDS.	EMBANKMENT PLUS 20% CU. YDS.
22	770 + 62	772 + 52	280	84
	TOTAL		280	84

EXCESS E-1 ROADWAY EXCAVATION

EMBANKMENT + 20% 84 C.Y.
E-1 ROADWAY EXCAVATION 280 C.Y.
E-3 CHANNEL EXCAVATION 6,764 C.Y.
TOTAL SUITABLE EXCAVATION 7,044 C.Y.
EXCESS EXCAVATION 6,960 C.Y.

E-11, WATER M-GAL. = VOL. x 5 / 1000

EMBANKMENT	84
I-22	197
B-112	73
TOTAL VOLUME	354
	1.8 M-GAL.

F-329-(23)

L-9 SEEDING & PROTECTING

STA. 774 + 05 TO STA. 775 + 00	1,184 S.Y.
STA. 775 + 00 TO STA. 785 + 00	20,086 S.Y.
STA. 785 + 00 TO STA. 795 + 00	21,259 S.Y.
STA. 795 + 00 TO STA. 805 + 00	22,326 S.Y.
STA. 805 + 00 TO STA. 815 + 00	21,229 S.Y.
STA. 815 + 00 TO STA. 825 + 00	24,887 S.Y.
STA. 825 + 00 TO STA. 835 + 00	15,833 S.Y.
STA. 835 + 00 TO STA. 845 + 00	18,961 S.Y.
STA. 845 + 00 TO STA. 855 + 00	18,377 S.Y.
STA. 855 + 00 TO STA. 865 + 00	16,112 S.Y.
STA. 865 + 00 TO STA. 875 + 00	13,232 S.Y.
STA. 875 + 00 TO STA. 879 + 00	7,494 S.Y.
STA. 96 + 00 TO STA. 103 + 00 (U.S. 20)	22,815 S.Y.
STA. 103 + 00 TO STA. 115 + 00,	12,411 S.Y.
STA. 115 + 00 TO STA. 119 + 38	3,046 S.Y.
RELOC. MANTLE ROAD	7,125 S.Y.
MANTLE RD. SPUR	4,222 S.Y.
RELOC. RIVER ROAD	8,517 S.Y.
RECONSTR. S.R. 535	2,871 S.Y.
RAMP GG	8,006 S.Y.
FRONTAGE ROAD "A"	14,953 S.Y.
FRONTAGE ROAD "B"	28,432 S.Y.
F.P. & E. R.R.	998 S.Y.
SPRING LAKES BLVD.	225 S.Y.
TOTAL =	314,601 S.Y.

L-9 COMMERCIAL FERTILIZER TONS = S.F. x 20 / 1000 x 2000

326,566 x 9 x 20 / 1000 x 2,000 = 29.391 TONS
SEEDING + SODDING = 326,566 S.Y.

L-9 AGRICULTURAL LIMING MATERIAL TONS = S.F. x 100 / 1000 x 2000

326,566 x 9 x 100 / 1000 x 2,000 = 146.955 TONS

FG-329-(23) STA. 808+46.23

SH. NO.	LOCATION	E-1 EXC. CU. YDS.	EMB. + 20% CU. YDS.
27	F.P. & E. R.R.	2933*	36
159	F.P. & E. R.R.	4026*	89
	TEMP. RUNAROUND	74	4831
160	F.P. & E. R.R.	2049*	42
	TEMP. RUNAROUND	35	2459
	TOTAL	9117	7457

* See Sh. 15

T-71, 10" REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

TOTAL NET LENGTH AS PER S.R. 2
TYPICAL SECTIONS = 9,424.88 FT.
WIDTH OF 4 LANES @ 12 FT. = 48.00 FT.
9,424.88 x 48.00 ÷ 9 = 50,266 S.Y.
TOTAL NET LENGTH OF DIRECTIONAL ROADWAY AS PER TYPICAL SECTIONS = 3,433.77 FT.
WIDTH OF 2 LANES @ 12 FT. = 24.00 FT.
3,433.77 x 24.00 ÷ 9 = 9,157 S.Y.
VARIABLE WIDTH DIRECTIONAL ROADWAY
198 x 25.00 ÷ 9 = 555 S.Y.
166.94 x 26.5 ÷ 9 = 492 S.Y.
TOTAL = 60,465 S.Y.

B-112, POROUS BASE COURSE

AS PER S.R. 2 TYPICAL SECTIONS
NORMAL SECTION = 5,483.69 FT.
AVERAGE END AREA = 13.833 SQ. FT.
TRANSITION SECTION = 300.00 FT.
AVERAGE END AREA = 14.50 SQ. FT.
TRANSITION SECTION = 400.00 FT.
AVERAGE END AREA = 14.893 SQ. FT.
SUPERELEVATED SECTION = 2,577.16 FT.
AVERAGE END AREA = 15.167 SQ. FT.
SUPERELEVATED SECTION = 789.03 FT.
AVERAGE END AREA = 15.951 SQ. FT.
AS PER DIRECTIONAL ROADWAY TYPICAL SECTIONS
NORMAL SECTION = 1133.35 FT.
AVERAGE END AREA = 6.917 SQ. FT.
TRANSITION SECTION = 600.00 FT.
AVERAGE END AREA = 7.353 SQ. FT.
TRANSITION SECTION = 563.70 FT.
AVERAGE END AREA = 7.542 SQ. FT.
SUPERELEVATED SECTION = 633.85 FT.
AVERAGE END AREA = 8.167 SQ. FT.
SUPERELEVATED SECTION = 502.87 FT.
AVERAGE END AREA = 7.788 SQ. FT.
TRANSITION SECTION = 354.94 FT.
AVERAGE END AREA = 5.833 SQ. FT.
SUPERELEVATED SECTION = 98.00 FT.
AVERAGE END AREA = 2.333 SQ. FT.
SUPERELEVATED SECTION = 100.00 FT.
AVERAGE END AREA = 1.75 SQ. FT.

5,483.69 x 13.833 ÷ 27 =	2,809 C.Y.
300.00 x 14.50 ÷ 27 =	161 C.Y.
400.00 x 14.893 ÷ 27 =	221 C.Y.
2,577.16 x 15.167 ÷ 27 =	1,448 C.Y.
789.03 x 15.951 ÷ 27 =	466 C.Y.
1,133.35 x 6.917 ÷ 27 =	290 C.Y.
600.00 x 7.353 ÷ 27 =	163 C.Y.
563.70 x 7.542 ÷ 27 =	157 C.Y.
633.85 x 8.167 ÷ 27 =	192 C.Y.
502.87 x 7.788 ÷ 27 =	145 C.Y.
354.94 x 5.833 ÷ 27 =	56 C.Y.
98.00 x 2.333 ÷ 27 =	8 C.Y.
100.00 x 1.75 ÷ 27 =	6 C.Y.
SUB TOTAL =	6,122 C.Y.
MINUS AREA THRU SPEED CHANGE LANES	
1471.25 x 4.583 ÷ 27 =	250 C.Y.
TOTAL =	5,872 C.Y.

T-31, BITUMINOUS SURFACE TREATMENT

BITUMINOUS MATERIAL, ONE SEAL
OPERATION OF 0.25 GAL. PER S.Y. OF B-21
33,900 x 0.25 = 8,475 GAL.
NO. 6 AGGREGATE APPLIED @ 0.008
CU. YD. PER S.Y. OF B-21
33,900 x 0.008 = 271 C.Y.

E-1, COMPACTED SUBGRADE

AREA AS T-71 = 60,465 S.Y.
AREA AS B-21 = 33,900 S.Y.
AREA AS I-7 = 655 S.Y.
TOTAL = 95,020 S.Y.

F-329-(23)

STA. 773 + 36 TO STA. 872 + 00 S.R. 2 (AS PER TYPICAL SECTION)
STA. 872 + 00 TO STA. 893 + 66.94 S.R. 2 E.B. DIRECTIONAL ROADWAY
STA. 872 + 00 TO STA. 888 + 31.77 S.R. 2 W.B. DIRECTIONAL ROADWAY

I-22, SUBBASE

NET LENGTH AS PER S.R. 2 TYPICAL SECTION
NORMAL SECTION = 5,483.69 FT.
AVERAGE END AREA = 37.478 SQ. FT.
TRANSITION AREA = 300.00 FT.
AVERAGE END AREA = 37.267 SQ. FT.
TRANSITION SECTION = 400.00 FT.
AVERAGE END AREA = 37.387 SQ. FT.
SUPERELEVATED SECTION = 2,577.16 FT.
AVERAGE END AREA = 37.055 SQ. FT.
SUPERELEVATED SECTION = 789.03 FT.
AVERAGE END AREA = 37.295 SQ. FT.
AS PER DIRECTIONAL ROADWAY TYPICAL SECTION
NORMAL SECTION = 1133.35 FT.
AVERAGE END AREA = 18.739 SQ. FT.
TRANSITION SECTION = 600.00 FT.
AVERAGE END AREA = 18.869 SQ. FT.
TRANSITION SECTION = 563.70 FT.
AVERAGE END AREA = 18.517 SQ. FT.
TRANSITION SECTION = 633.85 FT.
AVERAGE END AREA = 19.00 SQ. FT.
SUPERELEVATED SECTION = 502.87 FT.
AVERAGE END AREA = 18.295 SQ. FT.
TRANSITION SECTION = 354.94 FT.
AVERAGE END AREA = 5.00 SQ. FT.
SUPERELEVATED SECTION = 98.00 FT.
AVERAGE END AREA = 2.00 SQ. FT.
SUPERELEVATED SECTION = 100.00 FT.
AVERAGE END AREA = 1.50 SQ. FT.
TOTAL NET LENGTH OF EXTRA DEPTH SUBBASE = 1710.00 FT.
AVERAGE END AREA = 76.00 SQ. FT.

5,483.69 x 37.478 ÷ 27 =	7,612 C.Y.
300.00 x 37.267 ÷ 27 =	414 C.Y.
400.00 x 37.387 ÷ 27 =	554 C.Y.
2,577.16 x 37.055 ÷ 27 =	3,537 C.Y.
789.03 x 37.295 ÷ 27 =	1,090 C.Y.
1,133.35 x 18.739 ÷ 27	787 C.Y.
600.00 x 18.869 ÷ 27 =	419 C.Y.
563.70 x 18.517 ÷ 27 =	387 C.Y.
633.85 x 19.00 ÷ 27 =	446 C.Y.
502.87 x 18.295 ÷ 27 =	341 C.Y.
354.94 x 5.00 ÷ 27 =	66 C.Y.
98.00 x 2.00 ÷ 27 =	7 C.Y.
100.00 x 1.50 ÷ 27 =	6 C.Y.
1,710.00 x 76.00 ÷ 27 =	4,813 C.Y.
SUB TOTAL =	20,479 C.Y.
MINUS AREA THRU SPEED CHANGE LANES	
1,471.29 x 4.948 ÷ 27 =	270 C.Y.
TOTAL =	20,209 C.Y.

B-21, 3" WATERPROOFED AGGREGATE BASE COURSE

TOTAL NET LENGTH AS PER S.R. 2
TYPICAL SECTIONS PLUS 5 APPROACH SLABS 25.00 FT. = 9,549.88 FT.
WIDTH OF 2 SHOULDERS 4 FT. = 8.00 FT.
WIDTH OF 2 SHOULDERS 10 FT. = 20.00 FT.
TOTAL WIDTH = 28.00 FT.
NET LENGTH OF DIRECTIONAL ROADWAYS AS PER TYPICAL SECTION = 3,531.77 FT.
WIDTH OF SHOULDERS = 10 + 4 = 14.00 FT.
VARIABLE DIRECTIONAL ROADWAYS

100.00 x 13.00 ÷ 9 =	144 S.Y.
166.94 x 10.00 ÷ 9 =	186 S.Y.
9,549.88 x 28.00 ÷ 9 =	29,711 S.Y.
3,531.77 x 14.00 ÷ 9 =	5,494 S.Y.
SUB-TOTAL	35,535 S.Y.

MINUS AREA THRU SPEED CHANGE LANES
1,471.25 x 10 ÷ 9 = 1,635 S.Y.
35,535 - 1,635 = 33,900 S.Y.
33,900 x 3/36 = 2,825 C.Y.

E-11, WATER M-GAL. = VOL. x 5 / 1000

EMBANKMENT	549,225 C.Y.
I-22	27,138 C.Y.
I-18	654 C.Y.
B-19	5,806 C.Y.
B-112	6,200 C.Y.
TOTAL VOLUME	589,023 C.Y.
	2,945.1 M-GAL.

EARTHWORK

SHEET NO.	STATION FROM	STATION TO	E-1 ROADWAY EXC. CU.YDS.	EMBANKMENT PLUS 20% CU. YDS.
23	774 + 05	775 + 00	236	2,911
24	775 + 00	785 + 00	47,673 *	42,383
25	785 + 00	795 + 00	108,642 *	1,169
26	795 + 00	805 + 00	140,819 *	18
27	805 + 00	815 + 00	152,759 *	11,927
	RED CREEK		0	762
28	815 + 00	825 + 00	144,074 *	15,800
29	825 + 00	835 + 00	53,202 *	361
	FRONTAGE RD. "A"		1	4,309
30	835 + 00	845 + 00	1,970	60,850
	FRONTAGE RD. "A"		0	4,760
31	845 + 00	855 + 00	534	119,831
	FRONTAGE RD. "A"		7	3,719
	FRONTAGE RD. "B"		87	389
32	855 + 00	865 + 00	6,839	90,752
	FRONTAGE RD. "B"		1,544	6,386
33	865 + 00	875 + 00	5,198	35,789
	FRONTAGE RD. "B"		5,275	11,802
34	875 + 00	879 + 00	4,279	7,878
	RECONSTR. U.S. 20		100,274	8,291
	FRONTAGE RD. "B"		5,965	4,954
36	RECONSTR. U.S. 20		21,871	3,224
	FRONTAGE RD. "B"		9,236	1,474
38	RECONSTR. U.S. 20		1,428	5,417
	FRONTAGE RD. "B"		1,348	10,148
	SPRING LAKES BLVD. NORTH		188	0
136	RELOC. MANTLE RD.		5,084 *	23,809
137	RELOC. MANTLE RD.		1,088 *	3,316
148	MANTLE RD. SPUR		76	17,872
152	RELOC. RIVER RD.		165	40,570
169	RECONSTR. S.R. 535		2,180 *	0
170	RECONSTR. S.R. 535		1,399 *	19
176	RAMP GG		23,588 *	0
	FRONTAGE RD. "A"		3,491 *	878
TOTAL			850,520	541,766

EXCESS E-1 ROADWAY EXCAVATION

EMBANKMENT + 20%	549,225 C.Y.
E-1 ROADWAY EXCAVATION	859,637 C.Y.
UNSUITABLE EXCAVATION - CUT AREA	277,203 C.Y. *
UNSUITABLE EXCAVATION - FILL AREA	20,178 C.Y.
TOTAL UNSUITABLE EXCAVATION	297,381 C.Y.
SUB TOTAL EXCAVATION	562,256 C.Y.
EXCESS EXCAVATION - U-329(23)	6,960 C.Y.
E-3 CHANNEL EXCAVATION	7,030 C.Y.
TOTAL SUITABLE EXCAVATION	576,246 C.Y.
EXCESS EXCAVATION	27,021 C.Y.

* SEE GENERAL NOTES SHEET 15

E-4, BORROW

STA. 779 + 25 TO STA. 781 + 00 (See Sheet 46)
E-4, BORROW (GRANULAR MATERIAL) = 7,662 C.Y.

S.S. CE-101.04 COMPACTION, USING A HEAVY PNUEMATIC TIRED ROLLER

S.R. 2 = 95,020 S.Y.
U.S. 20 = 14,561 S.Y.
RAMP GG = 5,125 S.Y.
RAMP HH = 3,942 S.Y.
TOTAL = 118,648 S.Y. ÷ 2,000 = 59.3 HOURS