

BAR LIST FOR VARIOUS SECTIONS OF BARREL

SECTION A & BAR GROUP A

LENGTHS OF SECTION

DEPTH OF COVER

CLEAR SPAN

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BAR SIZE	PIN DIAM.	X	ADD FOR 2 HOOKS
#6	3"	5"	1-1/4"
#7	3 1/2"	5 3/8"	1-3/8"
#8	4"	6 1/8"	1-6"

**BENDING DIAGRAM FOR BARS  $b'$  and  $b_2'$**

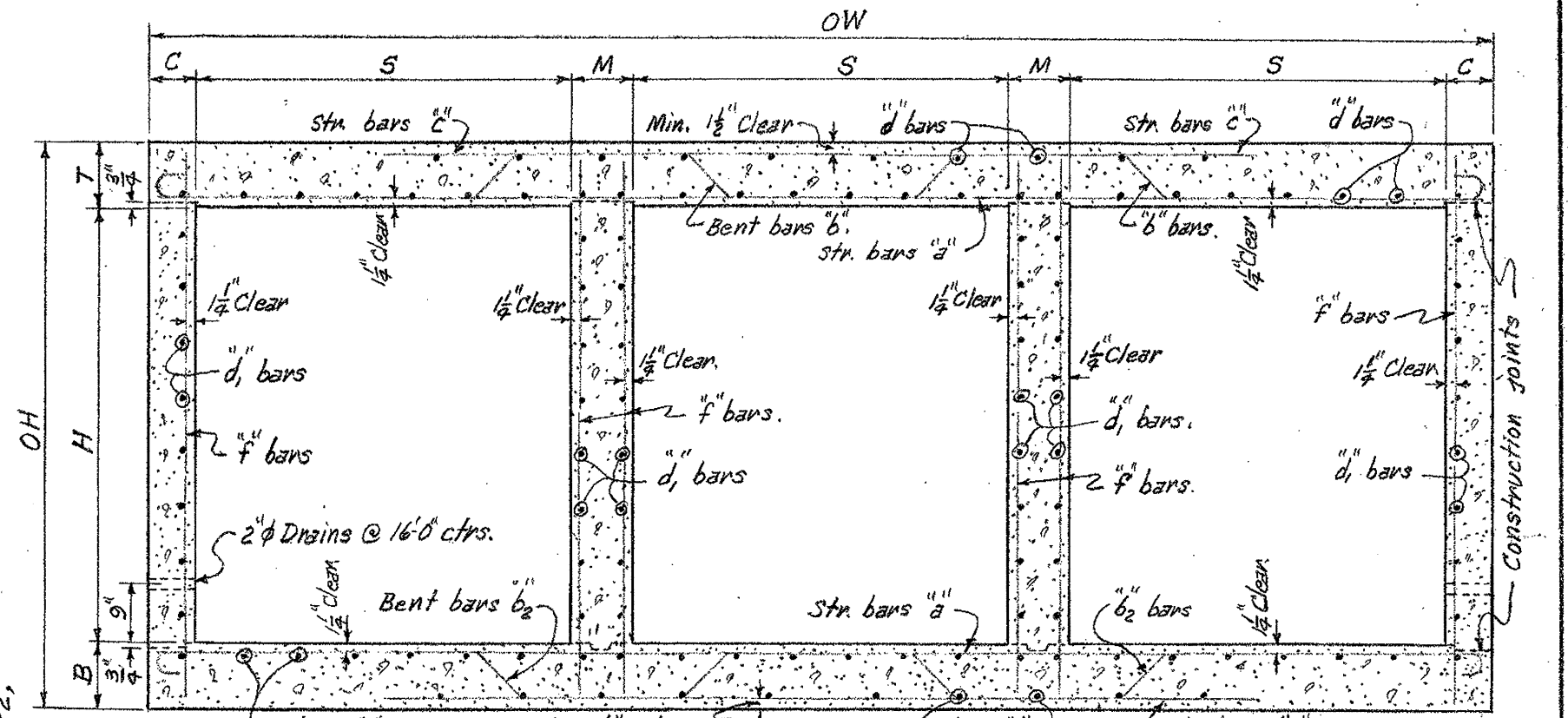
GENERAL NOTES:-

CONCRETE:- All concrete to be Class S<sub>1</sub> and shall be poured in the dry.  
All exposed surfaces to have 3/4" chertmats.  
REINFORCING STEEL:- Reinforcing to be deformed bars of intermediate or hard grade.  
BAR LAP:- In computing the quantities of steel from the tables add one lap for each additional 33'0" length of barrel over 32'0". Lap longitudinal bars 30 diameters.  
CONSTRUCTION JOINTS:- Construction joints between wingwalls, sidewalls, division walls and slabs shall be only where shown on plans.  
SPECIFICATIONS:- Arkansas State Highway Commission Standard Specifications for Highway Construction and applicable Special Provisions.

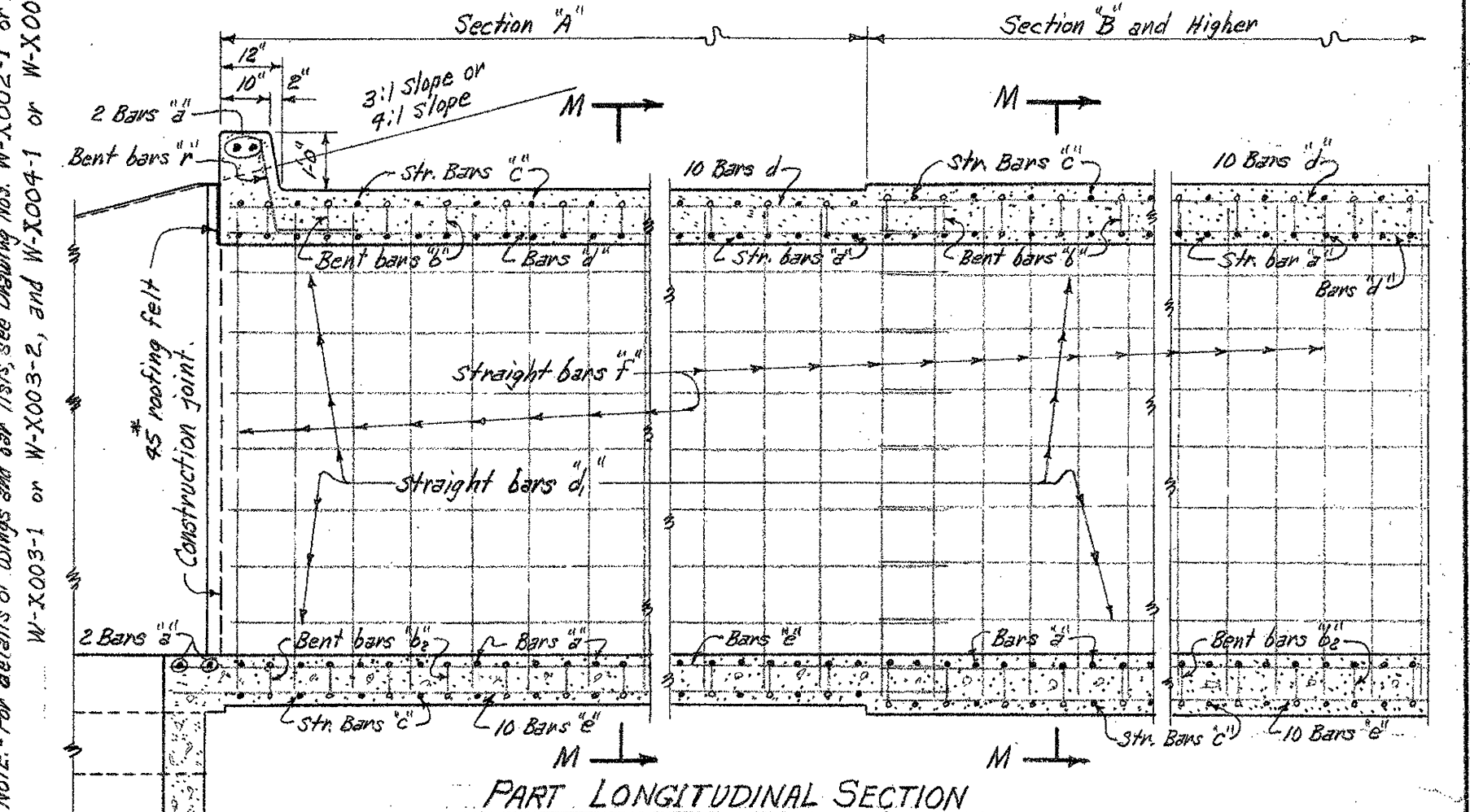
NOTE:- Dimension are to centers of bars ( $b_1$  and  $b_2$ )

DIMENSIONS                      QUANTITIES

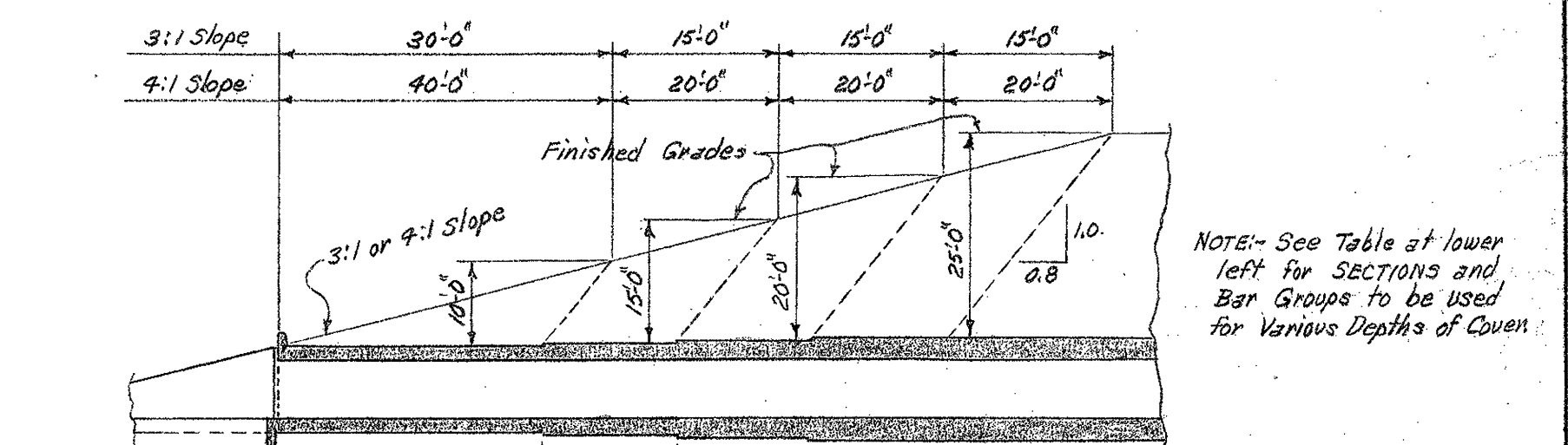
MAX DESIGN DEPTH OF COVER	BARREL DIMENSIONS										UNIT QUANTITIES				
	CLEAR SPANS		SQ. FT. OPENING	OVERALL WIDTH	THICKNESS OF TOP SLAB	THICKNESS OF SIDE WALLS			THICKNESS OF BOTTOM SLAB	OVERALL HEIGHT	REINFORCING STEEL				
	D	S				C	M	B			O/H	CLASS S CONC. PER LIK. FT. OF BARREL	PER LIN. FT. OF BARREL	PER LAP	TWO HEADLAPS
D	S	H	A	OW	T	C	M	B	O/H	CUYD	L.B.	L.R.	L.B.		
SECTION A' - 10'-0"	10'-0"	10'-0"	5'	120	26'-8"	8 1/2"	7"	9"	9"	6'-5 1/2"	1.934	266.35	86.84	372.04	
			6'	144	26'-8"		7"	9"		7'-5 1/2"	2.034	297.7	94.85	372.04	
			7'	168	26'-8"		7 1/2"	10"		9'-5 1/2"	2.210	310.70	96.84	374.14	
			8'	192	27'-0"		8"	10"		9'-5 1/2"	2.397	330.49	101.87	379.89	
			9'	216	27'-0"		9"	11"		11'-5 1/2"	2.587	358.4	106.88	377.64	
			10'	240	27'-0"		10"	12"		11'-5 1/2"	2.852	388.90	111.89	380.89	
	10'-0"	10'-0"	6'	180	32'-11"	10"	7 1/2"	10"	10 1/2"	7'-8 1/2"	2.731	428.10	101.87	582.24	
			7'	210	32'-11"		7 1/2"	10"		8'-8 1/2"	2.839	442.86	106.88	582.24	
			8'	240	33'-0"		8"	10"		9'-8 1/2"	2.977	465.81	111.89	583.24	
			9'	270	33'-0"		9"	11"		10'-8 1/2"	3.220	492.09	116.90	587.24	
			10'	300	33'-0"		10"	12"		11'-8 1/2"	3.488	528.07	121.91	591.24	
			11'	330	34'-0"		11"	12"		12'-8 1/2"	3.762	572.98	126.92	593.24	
SECTION B' - 15'-0"	10'-0"	10'-0"	5'	120	26'-8"	9 1/2"	7"	9"	10"	6'-7 1/2"	2.099	305.11	86.84		
			6'	144	26'-8"		7"	9"		7'-7 1/2"	2.198	313.05	91.85		
			7'	168	26'-8"		7 1/2"	10"		8'-7 1/2"	2.376	341.75	96.86		
			8'	192	27'-0"		8"	10"		9'-7 1/2"	2.514	371.95	101.87		
			9'	216	27'-0"		9"	11"		10'-7 1/2"	2.756	402.07	106.88		
			10'	240	27'-0"		10"	12"		11'-7 1/2"	3.023	442.94	111.89		
	10'-0"	10'-0"	6'	180	32'-11"	11 1/4"	7 1/2"	10"	11 1/2"	7'-8"	2.985	471.21	101.87		
			7'	210	32'-11"		7 1/2"	10"		8'-8 1/4"	3.093	484.78	106.88		
			8'	240	33'-0"		8"	10"		9'-8 1/4"	3.231	499.70	111.89		
			9'	270	33'-0"		9"	11"		10'-8 1/4"	3.477	522.16	116.90		
			10'	300	33'-0"		10"	12"		11'-8 1/4"	3.748	559.23	121.91		
			11'	330	34'-0"		11"	12"		12'-8 1/4"	3.963	590.37	126.92		
SECTION C' - 20'-0"	10'-0"	10'-0"	5'	120	26'-8"	12"	7"	9"	12 1/2"	6'-9 1/2"	2.263	353.13	86.84		
			6'	144	26'-8"		7"	9"		7'-9 1/2"	2.374	361.14	91.85		
			7'	168	26'-8"		7 1/2"	10"		8'-9 1/2"	2.556	395.50	96.86		
			8'	192	27'-0"		8 1/2"	10"		9'-9 1/2"	2.696	425.42	101.87		
			9'	216	27'-0"		9 1/2"	11"		10'-9 1/2"	2.992	462.51	106.88		
			10'	240	27'-0"		10 1/2"	12"		11'-9 1/2"	3.312	525.14	111.89		
	10'-0"	10'-0"	6'	180	33'-0"	12 1/2"	8"	10"	13"	8'-1 1/2"	3.264	506.67	101.87		
			7'	210	33'-0"		8"	10"		9'-1 1/2"	3.375	535.36	106.88		
			8'	240	33'-0"		8 1/2"	10"		10'-1 1/2"	3.517	571.98	111.89		
			9'	270	33'-0"		9 1/2"	11"		11'-1 1/2"	3.769	608.15	116.90		
			10'	300	33'-0"		10 1/2"	12"		12'-1 1/2"	4.026	673.90	121.91		
			11'	330	34'-0"		11"	12"		13'-1 1/2"	4.225	692.17	126.92		
SECTION D' - 25'-0"	10'-0"	10'-0"	5'	120	26'-8"	14 1/2"	7"	9"	14 1/2"	6'-11 1/2"	2.428	367.11	86.84		
			6'	144	26'-8"		7"	9"		7'-11 1/2"	2.564	373.20	91.85		
			7'	168	27'-4"		8"	10"		8'-11 1/2"	2.764	414.12	96.86		
			8'	192	27'-4"		9 1/2"	10"		9'-11 1/2"	2.924	440.02	101.87		
			9'	216	27'-4"		10"	11"		10'-11 1/2"	3.161	488.86	106.88		
			10'	240	27'-4"		11"	12"		11'-11 1/2"	3.439	525.45	111.89		
	10'-0"	10'-0"	6'	180	33'-0"	15 1/2"	8"	10"	15 1/2"	8'-4"	3.519	574.55	101.87		
			7'	210	33'-0"		8 1/2"	10"		9'-4"	3.658	577.92	106.88		
			8'	240	33'-0"		9"	10"		10'-4"	3.820	611.90	111.89		
			9'	270	33'-0"		9 1/2"	11"		11'-4"	4.079	647.18	116.90		
			10'	300	33'-0"		10 1/2"	12"		12'-4"	4.363	698.60	121.91		
			11'	330	34'-0"		11"	12"		13'-4"	4.568	756.00	126.92		
12'	12'	6'	180	34'-0"	16"	8"	10"	16 1/2"	8'-4"	3.579	606.26	131.93			
		7'	216	34'-0"		8"	10"		9'-4"	3.729	733.92	136.94			
		8'	240	34'-0"		8 1/2"	10"		10'-4"	3.735	763.34	121.91			
		9'	270	34'-0"		9"	11"		11'-4"	3.900	809.66	126.92			
		10'	300	34'-0"		10"	12"		12'-4"	4.165	842.91	131.93			
		11'	330	34'-0"		11"	12"		13'-4"	4.593	893.38	136.94			
12'	12'	6'	180	40'-0"	18"	8"	10"	18 1/2"	8'-4"	4.363	952.37	141.95			
		7'	216	40'-0"		8"	10"		9'-4"	4.504	1003.32	146.96			
		8'	240	40'-0"		8 1/2"	10"		10'-4"	4.579	733.92	136.94			
		9'	270	40'-0"		9"	11"		11'-4"	4.735	763.34	121.91			
		10'	300	40'-0"		10"	12"		12'-4"	4.900	809.66	126.92			
		11'	330	40'-0"		11"	12"		13'-4"	5.165	842.91	131.93			



TYPICAL SECTION M-M



PART LONGITUDINAL SECTION



TYPICAL LONGITUDINAL SECTION-SHOWING SECTIONS AND BAR GROUPS FOR VARIOUS DEPTHS OF COVER

NOTE:- Lengths of Sections, with Bar Groups to be shown on Cross Section Sheets.

SECTIONS & BAR GROUPS TO BE USED FOR VARIOUS DEPTHS OF COVER.

DEPTHS OF COVER	SECTIONS & BAR GROUPS FOR END SECTIONS			MID-SECTION AND BAR GROUP
	A	B	C	
5.0' to 3.5'	✓			A
10.0' to 19.5'	✓			B
15.0' to 19.5'	✓	✓		C
20.0' to 25.0'	✓	✓	✓	D

NOTE:- This drawing to be used in conjunction with Standard Drawing Nos. W-X003-1 or W-X003-2, and W-X004-1 or W-X004-2.  
Also Drawing Nos. W-X002-1 or W-X002-2.

CLASS S CONCRETE

ARKANSAS STATE HIGHWAY COMMISSION  
DETAILS OF STANDARD BARREL SECTIONS  
FOR  
REINFORCED CONCRETE BOX CULVERTS  
8', 10' & 12' SPANS 3:1 OR 4:1 SLOPES  
TRIPLES OVER 5'-0" COVER  
STANDARD DRAWING No. R-300X-X2

REVISIONS:-  
Wing Drwy. Nos. - W.C.H. 1-14-63.  
Bar size, spacing, no., & quant. for  
10' spans, SECT. C x D, W.C.H. 1-13-65.

## LENGTH OF SECTIONS FOR SKEWED CULVERTS

SKEW ANGLE	SEC. OF SKEW ANGLE	3:1 SLOPES		4:1 SLOPES	
		SECTIONS		SECTIONS	
		A	B, or C	A	B, or C
0°	1.0	22.0'	11.0'	32.0'	16.0'
15°	1.0353	22.776'	11.388'	33.129'	16.564'
30°	1.1547	*	12.702'	*	13.475'
45°	1.4142	*	15.556'	*	22.627'

\* Variable, see Drawings for Skewed Culverts.

### DESIGN LIVE LOAD

H20-S16 LOADING A.A.S.H.O. 1961

AND

SPECIAL MILITARY LOADING

Two 24,000 Lb. Axles @ 4'-0" ctrs

UNIT STRESSES:-

Class 5 Concrete ( $n=10$ ) 1  
Reinforcing Steel 20

Reinforcing Steel 29.

Designed by:- W.C.H.	8-7-62	Checked by:- R.H.S.	8-10-62
Drawn by:- W.C.H.	8-15-62	Checked by:- F.H.S.	8-20-62
Quantities by:- W.C.H.	8-17-62	Checked by:- R.H.S.	8-20-62