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MIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

P.W. DEPARTMENT

No. 2985 Press.

No. Mis.

13. 11. 1882 ~~198~~ .

l or roughly handled.

13th November 1882, No. 2985 W., Public Works.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Military Works.

o. 66.

ead—the following papers :—

G.O., dated 28th September 1882, No. 5172, Military.

ad—the following letter from Lieutenant-Colonel J. EWING, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Acting Secretary to Government, Military Department; dated Ootacamund, 15th September 1882, No. 1007 :—

With reference to this office letter, No. 484, dated 21st June 1882, embodied in oceedings of Madras Government, No. 4320, dated 14th August 1882, on the sub- t of providing proper stabling accommodation for Government horses in this Presi- ncy at a cost of Rs. 70 per stall, Sir Frederick Roberts desires me to state for the ormation of Government that, under His Excellency's instructions, the question of cheapest and best kind of stabling has been most carefully considered and worked by a Committee at Bangalore, the Proceedings of which His Excellency directs me submit herewith.

2. The cost of the cheapest plan of stabling, which is estimated at Rs. 137-8-0 recommended by the Committee, is more than the Commander-in-Chief hoped it ild be, but there can be no doubt that, in the long run, corrugated iron roofs, of ich the above plan of stabling is to consist, will prove infinitely the cheapest.

3. Sir Frederick Roberts, therefore, hopes that Government will strongly recom- nd to the Government of India the proposals for the construction of proper stabling Government horses in this Presidency. There is a strong concensus of opinion in or of stables for Government horses in this part of India, and His Excellency has son to believe that the proposal will receive the support of the Commander-in-Chief India.

4. A list of plans, estimates, &c., connected with the Proceedings of the Com- tee, is attached thereto, all of which I forward herewith.

Enclosures.

of Plans and Estimates accompanying Proceedings of Committee assembled at Bangalore on the 31st July 1882 to consider the subject of Stabling for the Royal Artillery.

One Tracing plan marked A-III.
One do. do. B-IV.
Two Estimates for same, one framed by a Native contractor, the other by Lieutenant Romilly, R.E.
One Plan marked C-II.
One Estimate for same.
One Plan marked E-I.
One Estimate for same.
One Plan marked "C-II, modified."
One Estimate for same.
One Specification report to accompany plans B-IV and C-II.
One Report on plans A, B, C, E, by Lieutenant Romilly, R.E.

Bangalore,
August 1882.

(Signed) N. SWANSTON, Colonel,
Asst. Quartermaster-General.

Proceedings of a Committee assembled at Bangalore on Monday, the 31st July 1882, by order of Lieutenant-General Payn, C.B., Commanding Bangalore Division.

PRESIDENT.

Lieutenant-General PAYN, C.B.,
Commanding Bangalore Division.

MEMBERS.

Lieutenant-Colonel RUSSELL,
Commanding 12th Royal Lancers.
Lieutenant-Colonel TILLARD,
Commanding E-B, Royal Horse Artillery.

Lieutenant ROMILLY, R.E.,
Colonel SWANSTON,
Asst. Quartermaster-General,
Veterinary Surgeon ANDERSON,
" " SMITH,
} In attendance.

The Committee having assembled, the President intimates that the subject to be considered is that of stabling for the horses of the three Batteries of Royal Artillery quartered at Bangalore.

Several proposals have been submitted to the Commander-in-Chief for adoption; these will be considered each on its own merits, and the Committee will have to express an opinion as to which best meets the desired end, due regard being given to cost.

The following plans are placed before the Committee:—

I.—As proposed by Colonel Sankey, R.E.—Estimated cost per stall Rs. 180.
II.—As proposed by Lieutenant-Colonel Tillard, R.A.
III.—That of the corrugated iron stabling of Royal Artillery at Kirkee.
IV.—That of tiled stabling of the Body Guard of the Governor of Bombay at Poona.

The several plans having been discussed, it is decided that estimates for plans II, III, and IV be prepared by Lieutenant Romilly, R.E., when the Committee will be in a better position to arrive at a satisfactory conclusion.

The Committee adjourns until such date as the estimates may be reported ready.

BANGALORE, 7th August 1882.

The Committee having re-assembled agreeably to decision at adjournment on the 31st ultimo, Lieutenant Romilly, R.E., reads a report drawn out by himself on the several plans, estimates for which he was instructed to prepare.

Iron stabling as at Kirkee.

On this report the Committee decide to throw out the proposal of stables on plan III.

Lieutenant-Colonel Tillard's plan.
Contractor's estimate, Rs. 102 per horse.
Lieutenant Romilly's estimate, Rs. 149 per horse.

As regards proposal II there appears a great drawback in the possibility of a horse pushing the inner uprights out of the perpendicular or breaking them in two by a kick, either of which contingencies would cause probable fatal consequences.

The placing these inner uprights four feet further inwards would remove the drawback, but by so doing only eleven feet of standing per horse would be obtained, which, in the opinion of the Committee, is not sufficient.

It is roughly estimated that alterations in the construction as suggested would raise the cost to nearly that of plan IV.

Lieutenant Romilly will, however, prepare fresh plan, and cast an estimate for the same.

Colonel Sankey's plan estimated by Public Works Department to cost Rs. 180 per horse.

With reference to proposal I, the Committee consider stone slabs on the flooring and partition walls between the horse-standings quite a mistake, whilst the necessity of the dwarf wall along the front is not apparent. Striking the cost of these three items out of the estimate, Lieutenant Romilly approximates the cost at about Rs. 140 per horse. The horses being in single rows become entirely exposed to wind and rain all along their front. To protect them, therefore, a wall along the front of the standings would be essential; this would necessitate a certain amount of ridge ventilation, adding to the cost of the stables.

The Committee consider a row of stabling of this kind a mistake, and are not prepared to recommend it.

Body Guard stables, Poona.
Cost there Rs. 132 per horse.
Contractor's estimate, Bangalore, Rs. 125, and Lieutenant Romilly's Rs. 150 to Rs. 205 per horse.

Proposal IV is that which the Committee unanimously most strongly recommend for adoption, as meeting in the most desirable manner the wants of troop stables, viz., absence of all uprights by which damage might accrue to a horse, ample ventilation, and cover.

Lieutenant-Colonel Tillard, who has experience of stables of this kind, speaks most highly in their favor.

The Committee adjourn until such date as Lieutenant Romilly can prepare plan and estimate of proposal II as modified.

"Modified form of proposal II costing Rs. 137-8-0 per horse, as planned and estimated by Lieutenant Romilly, R.E., at suggestion of the Committee."

The Committee having re-assembled agreeably to decision at adjournment on the 7th instant, Lieutenant-Colonel Tillard, Royal Horse Artillery, and Veterinary Surgeon Anderson, A.V.D., being absent, the former having proceeded to England, the latter to Egypt, consider the plan and estimate of a modified form of proposal II for stables.

Lieutenant Romilly explains that, at first sight, the use of corrugated iron, which he has introduced for roofing purposes, would appear to add considerably to the cost as compared with tiles, but the great saving in timber, which the use of iron roofing renders practicable, nearly, if not quite, compensates for the extra cost of the iron, and further the cost of repairs to iron roofing, as compared to the cost of repairs to tiled roofing as carried out at this station, is roughly estimated at a saving of 70 per cent.

The plan now under consideration is estimated to cost Rs. 137-8-0 per horse, and whilst being the least expensive of the several proposals submitted appears to embody all the good points in plan IV, and consequently is recommended for adoption in preference to that, owing to its smaller cost.

(Signed) W. PAYN, Lieut.-General,
Commanding Bangalore Division, President.
(Signed) J. C. RUSSELL, Lieut.-Colonel,
Commanding 12th Royal Lancers, Member.

BANGALORE,
18th August 1882.

Order—dated 28th September 1882, No. 5172, Military.

Approved and transferred to the Public Works Department for inclusion in the Budget for 1883-84.

(True Extract.)

(Signed) E. S. LAFFAN,
for Ag. Secretary to Government, Mily. Dept.

No. 87.

ORDER—dated 13th November 1882, No. 2985 W., Public Works.

Communicated to the Superintending Engineers, Third, Fourth, and Fifth Circles, who will estimate for the requisite stable accommodation at Bellary, St. Thomas' Mount, and Bangalore, on the plan approved by the Committee, which will be lithographed and circulated for information. Copies of the plan will also be furnished to the Military Department, in view to such action as may be necessary being taken in regard to the Military stations of Kamptee and Secunderabad, which are beyond the territorial limits of the Madras Public Works Department.

2. The Superintending Engineers concerned will at once report the approximate amounts to be provided in the outgoing Military Works Budget for stabling at Bellary, St. Thomas' Mount, and Bangalore, and will as soon after as practicable submit for sanction estimates in the regular form.

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineers, Third, Fourth,
and Fifth Circles, with copies of plan.
" the Military Department, with do.

Exd. S. T. Austin.
Spare Copies

BUILDINGS AND ROADS.
MILITARY WORKS.

Govt. of (1882) Madras.

PUBLIC WORKS.

Dated November, 13th.

Recd.

G.O., 13th Nov. 1882, No. 2985 W.

NOVEMBER.
Nos. 86-87.

Stables.

The approximate amounts required to be provided in the Military Works Budget on account of — at Bellary, St. Thomas' Mount, and Bangalore to be reported by the Superintending Engineers concerned, and estimates ordered to be submitted.

Public Works Department, 1882-83.

Current No. 6830
~~Letter~~ Military G.O. No. 5172
Dated the 28.9.82
From the Secy: to Govt: Mily: Dept:

NOTE OF REMARKS.

These are trial plans & ests: for determining proper stabling for 404 Govt: Horses of the R. A. at Agram in Bangalore.

The Committee assembled at Bangalore on the 31.7.82 to report on the designs of stabling, strongly recommended the adoption of the plan of the stabling for the horses of the Body Guard of the Governor of Bombay at Poona, as meeting the wants of Troop stables, viz: absence of all uprights by which damage might occur to a horse - ample ventilation - & cover - but owing to smaller cost zinc roof is recommended, according to the modified design C. II. submitted by Lieut: Romilly [illegible]

trial pits, countersignatur
of the authorities concerne
&c., & especially as th
military building is no
accordance with an
Standard design, the
special sanction of
Govt: of India must
obtained before the
commencement of the
work, vide P. W. D
Code Chap IX para
1135 & 1136.

10/10/82.

The same design by Lieut Romilly marked B. for a Tiled roof, which should be cooler than a Zinc roof, cost per horse Rs: 208-

Another design, Tile roofing without flat tiles, marked C. Cs: Office B. Cost per horse Rs: 125-

The same design marked B. IV is the contractors Est: per horse Rs: 125-

A new design marked C. from C. Cs: Office, Tiled roof supported on stone pillars entirely, cost per horse Rs: 101- but this does not meet the requirements of the Committee-

The same design modified marked C. II; cost per horse Rs: 102.

The design marked E. I. submitted by Lieut: Fahey for 40 stalls for horses of the R. A. Cost per horse Rs: 180- This is a rough pencil drawing without the countersignature of the Supg. Engr & the military authorities- The roof of this design will be coupled & tiled, supported in front by a wall, & stone pillars in rear, with a rear Verandah on stone pillars also. These stone pillars support the roof, & also form a partition between the stalls in the Verandah, which may be objectional, vide Pro: of Committee assembled at Bangalore d/ 31.7-82.

If the corrugated iron roof stabling at Rs: 137.5.0 per stall, as being the cheapest plan, as per G. O. No: 5172 d/ 28.9.82, are to be adopted in preference to the tiled roof of the same design - which would be a cooler shed than the zinc roof - The S. E. Fifth Circle may be asked to rearrange the Est. in regular Est: form in detail & further working drawings, with site plan, trial pits, countersignature of the authorities concerned &c., & especially as this military building is not in accordance with any standard design, the special sanction of the Govt. of India must be obtained before the commencement of the work, vide P. W. D. Code Chap IX paras 1135 & 1136-

L.J.
10/10/82.

5 4

B

Rubble stone in clay - No stone to be less than one third of a cubic foot, nor less than 4 inches thick - the largest stones shall be selected for the face and be set flush in mortar; one header being allowed for three stretchers - Through stones extending to full breadth of wall, 2 feet long, shall be laid in each course at 6. feet apart. The stones of one course shall be all of one thickness; mortar joints not more than ½" thick

Brick in clay - Mud mortar joints shall not exceed ½" thick, and be well tempered - No bats shall be used, ~~except~~, except where necessary for bond. The bond to be English. Bricks to be well saturated with water before laying, and thoroughly bedded and flushed with mortar.

Plastering with lime mortar 1 coat. joints of brick work or masonry shall be raked out to the depth of ½ an inch - The plaster shall be levelled to the thickness stated, and well smoothed with a wooden rubber, and smoothed off with a trowel.

Total cost of Each Tomb Rs 87

Archwork with bricks in lime mortar - the voussoir joints shall be perpendicular to the tangent of the curve at all points and the joints shall be ¼" thick.

Woodwork - Mysore jungle wood - timber shall be of the best quality, well seasoned, free from large or loose knots, shakes or defects of any kind, and of the scantling entered in the detail estimate.

Sun-burnt brick in clay - work same as that specified for brick in clay, only that these bricks will be sun-burnt, sound and hard.

Concrete. Composed as follows, 1 part unslaked stone lime to 2 sand, 2 surki, 6 brick jelly ¾", 8 broken stones ¾" in size - The lime, sand and surki having been ground will be thoroughly mixed with the coarse materials till each piece has some mortar attached to it. The consolidation of the concrete shall be effected by ramming it in layers of 6" or 9" as may be directed.

Roofing with pan tiles without flat tiles -

Pan tiles to overlap half their length. The eaves shall leave a reeper wedge shaped 2" thick on the front side and ¾" thick on the rear side, and 2½ inches broad. This will be paid for per cubic foot in addition to the rate for roofing

Total Cost of Each Item No. 87

N C

Estimate

For a tiled Shed for 68 horses

Details	No	Measurements			Contents	Total
Excavation						
To end walls	2	36	3	3	648	
" Uprights	66	2½	2	3	990	
" Ditto	66	2½	2	3½	1155	2793
Stone in Sand						
Foundation to end walls	2	36	2½	3	540	540
Brick in Clay						
End walls	2	35	2	9½	1330	
Gables	2	35	½	4½	473	
Pillasters	8	3	½	9½	114	
Total					1917	
Deduct:						
Frames 2-6×2×9½ = 228						
Arches 2 areas = 150					378	1539
Brick in Chunam						
Under eaves	2	40	½	½	60	60
Plastering						
End walls	4	35	9½	-	1330	
Gables	4	35	4½		630	
Ends of wall	4	9½	2		76	
Intradas	2	21	1½		63	
Sides of entrance	4	9½	2		76	
Pillasters	8	9½	½		38	2213
Deduct:						
Arches 4 = areas 153						
Entrance 4: 6×9½ 228						381
			Total			1832

Total Cost of Each Team Rs 87

Arch work	2	25	1½	1½	113	113
Cornice						
To gables	2	46½	"	"	93	
Round gate pillars	4	9½	"	"	38	131
Teak wood work wrought & put up						
Rafters	330	11½	5"	3"	395	
Do	330	13½	5"	3"	464	
Collars	165	14	4"	3"	192	
Do	165	7	4"	3"	96	
Summers	4	25½	7	5	250	1
Unburnt brick in clay						
Walls on both sides of passage	2	254½	1	2½	1273	1273
Mud plaster	2	254½	5	"	2545	2545
Concrete round stone pillars	140	6	½	2¾	1155	1155
Stone slabs						
2½ × 2. Slabs under uprights	140	2½	2	(½)	140	140
Uprights	70	13	1½	(1½)	70	70
Do	70	16	1½	(1½)	70	70
Roofing						
With purlins & flat & pan tiles	2	259⅓	23	"	119.14	119.14
Colour washing						
Inside walls	4	35	13	"	18.20	18.20
Dog irons with bolts & nuts	32	½" dia	round iron			32

Abstract

Items	Per	Rate			Quantity Contents	Cost Total
Excavation	Cft	.	.	1	2793	15
Stone in sand	Cft	"	2	6	520	57
Brick in clay	Cft	.	2	.	1539	192
Brick in Chunam	Cft	.	2	9	60	10
Plastering	Sqr	1	8	"	18.	27
Arch work	Cft	"	3	"	113	21
Cornice	Rft	"	2	"	131	16
Teak wood work	Cft	2	12	"	1364	3757
Unburnt brick in clay	Cft	"	"	10	1273	66
Mud plaster	Sqr	"	8	"	25.	13
Concrete	Cft	"	2	9	1155	198
Stone slabs 2½×2	Each	"	6	8	140	58
Stone uprights 13×1½	do	2	4	.	70	171
Do do 16×1½	do	3	"	.	70	210
Roofing flat & pantiles & borders	Sqr	16	"	"	119.	1936
Colour washing	Sqr	"	2	"	18.	2.
Dog irons with nuts	Each	3	"	(	32	96

Total Rupees 6833

Rs 102 per Stall Rs 101.

Total Cost of Each Term Rs 87

Estimate

For a tiled Shed for 58 horses

Details	No	Measurements			Contents	Total
Excavation						
To End walls	2	36	3	3	648	
Uprights	56	2½	2	3½	980	
Do.	56	2½	2	3	840	2438
Stone in Sand						
Foundations to End walls	2	36	2½	3	540	540
Brick in Clay						
End walls	2	35	2	9½	1330	
Gables	2	35	1½	4½	473	
Pillasters	8	3	½	9½	114	
	Total				1917	
Deduct						
Entrance 2 = 6×2×9½ = 228						
Arches, 2 = Areas 150					378	1539
Brick in Chunam						
Under eaves	2	40	1½	½	60	60
Plastering						
End walls	4	35	9½	"	1330	
Gables	4	35	4½	"	630	
Ends of wall	4	9½	2	"	76	
Intrados	2	21	1½	"	63	
Sides of Entrance	4	9½	2	"	76	
Pillasters	8	9½	½		38	2213
Deduct – Arches 4 = areas 153 -						
Entrance 4 = 6 × 9½ - 228 -						381
	Total					1832

Arch work	2	25	1½	1½	113	113
Cornice						
To gables	2	46½	.	.	93	
Roundgate Pillars	4	9½	"	.	38	131
Teak work wrought & put up						
Rafters	282	11½	5"	3"	338	
Do	282	13½	5	3	376	
Collars	141	14	4	3	164	
Do	141	7	4	3	82	
Summers	4	220	7	5	214	1174
Burnt brick in clay						
Walls on either side of passage	2	217	1	2½	1085	1085
Mud plastering	2	217	5	"	2170	2170
Concrete round uprights	121	6	½	③	1080	1080
Stone slabs	60	15	1½			
Slabs under uprights	120	2½	1½	6	120	120
" uprights	60	13	1½		60	60
Do	60	16	1½	"	60	60
Roofing with reepers flat & pantiles						
Stables	2	222	23	"	102.12	102.1
Colour washing						
End walls	4	35	13	"	18.20	18.2
Dog irons with nuts	30	½" round iron			30	30

Abstract

12

Items	Per	Rate			Quantity	Cost
Excavation	Cft	"	"	1	2468	13
Stone in sand	Cft	"	6	6	540	57
Brick in clay	Cft	"	2	"	1539	192
Brick in Chunam	Cft	"	2	9	60	10
Plastering	Syr	1	8	"	18.	27
Arch work	Cft	"	3	"	113	21
Cornice	Rft	"	2	"	131	16
Teak wood work	Cft	2	12	.	1174	3228
Unburnt brick in clay	Cft	"	"	10	1085	57
Mud plaster	Syr	"	8	"	22.	11
Concrete	Cft	"	2	9	1080	186
Stone slabs 2½×2	Each	"	6	8	120	50
Stone uprights 13×1½	do	2	7	"	60	146
Do — do — 16×1½	do	3	"	.	60	180
Roofing with flat & pantiles	Syr.	16	"	"	102	1632
Colour washing	Syr	"	2	"	18.	2
Dog irons with nuts	30	3	"	"	30	90
					Total Rupees	591
Total for 2 Sheds					Rupees	11,82

Total Cost of Each Truss Rs 87

Estimate

for a tiled Shed for 58 horses

Details	No	Measurements			Cubic	Total
Excavation						
To end walls	2	36'	3'	3'	648	
" Uprights " Do	56	2½	2	3½	980	1,628
Stone in Sand						
Foundation to End walls	2	36	2½	3	540	540
Brick in clay						
End walls	2	35	2	9½	1330	
Gables	2	35	1½	4½	[illegible]3	
Pillasters	8	3	½	9½	[illegible]4	
Total					1917	
Deduct						
Entrance 2 = 6 × 2 × 9½ = 228						
Arches 2 Areas 150					378	1539
Brick in Chunam						
Under eaves	2	40	1½	½	60	60
Plastering — End walls	4	35	9½	"	1330	
Gables	4	35	4½	"	630	
Ends of walls	4	9½	2	"	76	
Intrados	2	21	1½	"	63	
Sides of Entrance	4	9½	2	"	76	
Deduct Pillasters	8	9½	½	"	38	2213
Arches 4 = Areas 153'						
Entrance 4 = 6 × 9½ 228						381
						1832

Total cost of Each Team Rs 87

Archwork	2	25	1½	1½	113	113
Cornice						
To gables	2	46½	–	–	93	
Round gate pillars	4	9½	–	–	38.	131
Burnt brick in clay						
Walls on either side of passag	2	217	"	2½	1085	1085
Mud plastering	2	217	15	"	2170	2170
Concrete round uprights	56	6	½	3.	504	504
Stone Slabs						
Slabs under uprights	60	2½	2	(6")	60	60
Stone uprights	60	13	1½	(6")	60	60
Teak woodwork. wrought. & put up						
Tie beams	14	36½	6"	9"	192	
Principal Rafters	28	15	4	6.	70	
Queen posts	28	10	4	3	23	
Struts	28	7	4	3	16	
Straining pieces (beams)	14	10½	4	6	25	
Butting sills	14	11	6	3	19	
Supports to Ventilators	28	7	4	3	16	
Caps	14	1½	9	9	12	
Blocks	168	1¼	4	6.	35	
Purlins	8	220	5	4	428	
Common Rafters	282	16	3	5	470	
Rafters to Ventilators	282	8½	3	4	200	
Purlins to Ventilators	3	224	3	4	56	
Eaves boards	4	222	½	6"	19	1581
Ironwork for 14 Trusses						
┌ Angle irons with bolts & nuts	56	1½	2"	¼	56	56
Stirrups do do	56				56	56
┌ Angle irons do do	28	1½	2"	¼	28	28

Estimate

B

For a tiled shed for 68 horses

Details	No	Measurements			Contents	To
Excavation						
To end walls	2	36	3	3	640	
To uprights	56	2½	2	3½	1155	17
Stone in sand						
Foundation to end walls	2	36	2½	3	540	5
Brick in Clay						
End walls	2	35	2	9½	1330	
Gables	2	35	1½	4½	473	
Pilasters	8	3	½	9½	114	
	Total				1917	
Deduct						
Entrance 2 = 6 × 2 × 9½ 228						
Arches 2 areas – 150					378	1
Brick in Chunam						
Under eaves	2	40	1½	½	60	
Plastering						
End walls	4	35	9½	"	1330	
Gables	4	35	4½	"	630	
Ends of wall	4	9½	2	"	76	
Intrados	2	21	1½	"	63	
Sides of Entrance	4	9½	2	"	76	
Pilasters	8	9½	½	"	38	
					223	
Deduct						
Arches = 4 = areas 153						
Entrances 4 = 6 × 9½ 228					381	
Archwork	2	25	1½	1½	113	

Cornice — To gables	2	46½	"	"	93	
Round pillars	4	9½	"	"	38	131
Teakwoodwork. wrought & put up						
Tie beams	16	36½	6"	9"	219	
Principal Rafters	32	15	4	6	80	
Queen posts	32	10	3	4	27	
Struts	32	7	3	4	19	
Straining beams	16	10½	4	6	28	
Butting sill	16	11	6	3	22	
Uprights to support Ventilators	32	7	4	3	18	
Caps	16	1½	9"	9"	14	
Blocks	192	1¼	4	6	40	
Purlins	8	25½	5	7	501	
Common Rafters	330	16	3	5	530	
Ventilator do	330	8½	3	4	225	
Purlins to Ventilators [illegible]	3	258	3	4	64	
Eave boards	4	259	½"	6"	22	1829
Iron work for 16 Trusses						
Angle iron with bolts & nuts	64	1½	2"	¼"	64	64
Stirrups do do	64	"	"	"	64	64
Angle irons do do	32	1½	2	¼	32	32
Unburnt brick in clay, walls	2	264½	1	2½	1273	1273
Mud plastering do	2	252½	5	"	2545	2545
Concrete round stone uprights	140	6	½	2¾	1155	1155
Stone slabs	70	2½	2	(6")	70	70
Stone uprights	70	13	1½	6"	70	70
Roofing	2	257	17½	"	9065	
do	2	260	8½	"	4420	13485
Colour washing	4	36	13	"	1820	1820

Abstract

Items	Per	Rate			Quantity	Cost
Excavation	Cft	"	"	1	1795	9
Stone in sand	Cft	.	1	6	540	57
Brick in Clay	Cft	.	2	.	1539	192
Brick in Chunam	Cft	.	2	9	60	10
Plastering	Sqr	1	8		22	24
Arch work	Cft	.	3	"	113	21
Cornice	Rft	.	2	"	131	16
Teak wood work	Cft	2	12	"	1829	5030
Iron angle bolts & nuts	Each	3	"	"	64	192
Stirrup irons do	Each	3	"	"	64	192
Angle irons do	Each	3	"	"	32	96
Unburnt brick in clay	Cft	"	"	10	1273	66
Mud plaster	Sqr	"	8	.	25	13
Concrete	Cft	"	2	9	1155	198
Stone slabs 2½×2'	Each	"	6	8	70	29
Stone uprights 13×1½	do	2	7	"	70	171
Roofing with flat & pantiles & borders	Sqr	16	"		135	2160
Colour washing	Sqr				18,20	2
				Total Rupees		8476

[illegible]

Total cost of Each Truss Rs 87.

Roofing						
With teak reepers flat & pantiles	2	222	17½		7770	16
Ventilating Roof	2	8½	222		37.74	115.44
Colour washing	4	35	13	"	18.20	18.20

Abstract

Items	Per	Rate			Quantity	Cost
Excavation	Cft	"	"	1	7628	8
Stone in sand	Cft	"	1	6	520	57
Brick in clay	cft	"	2	"	1539	192
Brick in Chunam	Cft	"	2	9	60	10
Plastering	Syd	1	8	"	18.	27
Arch work	Cft.	.	3	"	113	21
Cornice	Rft	"	2	.	131	16
Teak wood work	Cft	2	12	"	1584	4348
Unburnt brick in clay	cft	"	"	10	1085	54
Mud plaster	Sy	"	8	"	22	11
Concrete	Cft	"	2	9	50.4	87
Stone slabs	each	"	6	8	60	25
Stone uprights	do	2	7	"	60	146
Roofing	Syd	16	"	"	115	1840
Colour washing	Sy	"	2	"	18	36
Angle irons with bolts	each	3	"	"	56	168
Stirrups — do	do	3	"	"	56	168
Angle irons do	do	3	"	"	28	84

Total for 2 Sheds — Total Rupees 7295

Rupees 14590

Rs 135 per Shed

Total cost of Each Truss Rs 87

Estimate for a Queen Post truss 35ft span central interval. Timber used Sugone teak

Details	No	L	B	D	Content
Timber					17
Tie beam	1	36½	4"	5"	5
Principals	2	15	4	6	5
Straining beam	1	10	4	6	1
do Sill	1	10	4	3	0
Queen posts above	2	3	4	3	0
d. d.	2	7	4	3	1
Struts	2	7	4	3	1
Upper principals	2	7	4	3	1
Caps	3	1½	9	9	2½
Blocks	10	1½	4	6	2
		Total c.ft			
Iron work					
Stirrups	2	3	2	¼	1/48
Straps	4	3	2	¼	1/24
		Total lbs			
Wood oiling					
For whole truss.					

Abstract.

Head	Quantity	Rate	Per	A
Timber, wrought & framed	20 c.ft	2.50	c.ft	
Iron work	28 lbs	·25	lbs	
Wood oiling	1·8 Sq.	1·5	Square	
Raising & fixing in position.	1	5	Each	
Sundries.				
Total cost of Each Truss				Rs

Abstract for Rate for 20 stalls on Poona plan B.

Details		Quantity	Rate	Per	Amount
Excavation	c.ft	275	5.0	100 c.ft	13.75
Masonry	c.ft.	671	12.5	"	83.87
Timber, trusses	No	11	87.0	Each	957.00
" rafters &c	c.ft.	346	2.75	c.ft	951.50
Roofing	sq.ft	4004	16.00	Square	640.00
Gravelling (6")	sq.ft	1988	1.50	Square	29.82
Slab stones (3")	sq.ft	680	1.00	16 sq.ft.	42.50
Drain. V shaped	R.f.	154	.44	r.ft.	67.76
Mud walling.	c.ft	300	.03	c.ft.	9.00
Wood oiling	Sqr	49	1.25	Square	61.25
Contingencies @ 5%					123.55
Total for 20 stalls					Rs 2980.00

or Rs 149 say Rs 150 per stall

The cost for covering alone is Rs 142 per stall.

If timber for trusses costs Rs 4.5 per c.ft, each truss would cost Rs 107, & the stalls complete would cost Rs 208 each horse

F. J. Romilly Lt R.E.

Ex Engr

2. 8. 32

Estimate for 10 double stalls on Poona plan B.

Details	No	Measurement L	Measurement B	Measurement D	Contents	Totals
Excavation	22	2½'	2½"	2"	275	275
Masonry						
Foundations of Pillars	22	2½'	2½"	2"	275	
Superstructure do.	22	1½'	1½"	8"	396	671
Timber.						
Trusses (see detail)	11					11
Ridge pole & purlins	3	77'	2½"	7"	28 1/12	
Purlins, (main)	8	77'	4"	6"	102 2/3	
Common rafters, long	102	17½'	4"	3"	148 3/4	
do , short	102	8'	4"	3"	64	
Eave boards.	4	77'	½"	6"	2 1/6	345 2/3
Roofing						
Main roof	2	77'	18'		2772	
Ventilator do.	2	77	8		1232	4004
Gravelling						
Along pickets.	2	75	13¼		1987½	1987½
Slab stones						
In stalls	40	7	2		560	560
Drains						
V. shaped outside	2	77			154	154
Shallow slab inside.	40	6	½		120	120
Mud walling						
On each side of passage	2	75	1	2	300	300
Wood oiling						
All roof timber but trusses.					4898	48.98

B. IV

Estimate for
Covered Stables
Plan B at
Poona.
Roughly

Details & Cost for Trusses & Corrugated roofing.

	Details	No.	Measurement L	Measurement B	Measurement D	Contents	Total
Timber	Tie beam	1	16	4"	4"	1 7/9	
	Principal	1	16	4"	6¼"	2 7/9	
	Strut.	1	7	4"	4"	7/9	
	Blocks	5	9"	3"	4"	5/16	c.ft. 5 2/3
Ironwork	Straps	2	2½	1¾"	3/8"	5 ft	
	Stirrups	2	4	1¾"	3/8"	6	11 ft
Wood oiling	Whole truss		39	1½		58½	sft 58.5

Abstract	Per	Rate	Quantity	Cost Rs.
Timber	c.ft	4.50	5.66	25.47
Iron work	lb.	.25	24.2	6.05
Wood oiling	square	1.25	.585	.73
Getting up & fixing	Each			2.00
Sundries.				.75
Total for one Truss			Rs	35.00

For Materials & laying corrugated iron sheeting

Iron sheeting No 24	Square	22.44	1	22.44
Rivets & riveting	lbs	.125	3	.37
Smith	diem	.75	2	1.50
Cooly	"	.18	1	.18
Boy	"	.09	1	.09
Sundries				.42
Total cost per square				25.00
For sheeting No 18	Square	25.00	1	25.00
Labour &c		4.00		4.00
Total per square				29.00

Calculations for timber framing for a roof covered with Corrugated iron No 24 B.W.G

Data.

Span – 14ft. Length of principal rafter 14½' say 15ft. Angle of roof 15°. Purlins 3½' say 4ft apart. Trusses, king post at 7½ft central interval.

Weight to be carried per square

Corrugated iron No 24 B.W.G	1 cwt	0 qr.	24 lb.
½" teak planking	2 "	2 "	0
Framing	6 "	0 "	0
wind pressure	30 "	0 "	0
Total =	45	0	24

∴ Weight per sq. ft = $\frac{46 \times 112}{100}$ = 51·52 lbs.

or 50 lbs per sq. ft may safely be taken as the wind pressure has been very liberally estimated.

For Stresses in the Trusses

Total weight carried by one truss will be 15 × 7·5 × 50 lbs = 5625 say 5630 lbs

∴ Compression on the principals } = $\frac{5630}{4}$ cot. 15° = $\frac{5630}{4}$ × 3·7
= 5216 lbs.

Tension on tie = $\frac{5630}{4}$ cosec 15° = 3·8 × 140
= 5350 lbs.

Say 5220 & 5400 lbs respectively

The timber to be well seasoned Rangoo
Teak for which the following coeffic
are taken from Rankine's Rules and Ta

Modulus of Elasticity or E } = 2,400,000 lbs.

Ultimate strength in compression or f_c } = 12,000 lbs.

Factor of safety = 8, the factor is taken at this minimum for a live load as the greater portion of the stress in the roof is due to wind pressure which may be applied in sudden gusts.

Tenacity of plate = 15,000 lbs.

Calculations of Dimensions

Tie beam

Tension = 5400. Let k = the sectional area

∴ resistance to tearing = 15000 × k.

$$\therefore \frac{15000}{8} k = 5400$$

$$\text{or } k = \frac{5400 \times 8}{15{,}000} = 2{\cdot}81''$$

or 2" by 2" would suffice

Strut.

The compression on the strut is the same as that on the lower half of the principal = 5220 lbs. = P.

Let d'' = depth of strut

b'' = breadth

l'' = length = 7 × 12 = 84"

a = $\frac{1}{250}$ the strut being fixed at both ends.

f_c = working resistance in compression of 12,000 lbs.

S = sectional area of strut.

If b = 8" the ratio of the least dimension to the length would be more than 1/20 & the strut must be calculated as a long compression bar.

Then

$$\frac{P}{S} = f_c \div \left(1 + a\frac{l^2}{b^2}\right)$$

$$= \frac{12000}{8} \div \left(1 + \frac{1}{250} \times \frac{84^2}{8^2}\right)$$

$$= 1500 \div (1 + 3{\cdot}14)$$

$$= \frac{1500}{4{\cdot}14}$$

$$\therefore S = \frac{5220 \times 4{\cdot}14}{1500}$$

$$= 14{\cdot}4$$

$$\therefore \text{ if } b = 8'' \quad d = \frac{14{\cdot}4}{8} = 4{\cdot}8 \text{ say } 5''.$$

Suppose the strut to be 4" × 4" and a tenon of 2½" × 1½" allowed. The sectional area supporting the thrust would then be 16" − 3·75 = 12·25 sq inches & the pressure per sq inch on the shoulders would be $\frac{5220}{12{\cdot}75}$ = 410 lbs nearly, which would be ample for bearing surface.

The principal.

As the arrangement of the purlins does not concentrate the load over the joints of the trusses the principals have to sustain a transverse stress as well as a direct thrust.

The greatest stress produced by bending under the uniformly distributed load as well as the greatest total intensity of stress will be at the point of junction mid way between the point of junction of the strut & either end of the rafter

Let b'' = breadth = 4''
d'' = depth
c'' = half length unsupported
$= \frac{8\times12}{2} = 48''$
w = weight per inch run on principal $= \frac{15\times7.5\times50}{15\times12}$ lbs
$= \frac{5630}{180}$ = 82 lbs nearly
I = moment of inertia of section
$= \frac{1}{12}bd^3 = \frac{1}{3}d^3$
S = factor of safety

$$\therefore \frac{wc^2}{2} = \frac{f_0 I}{y_0} = \frac{f_0 2d^2}{3}$$

$$\therefore f_0 = \frac{3wc^2}{4d^2} = \begin{cases}\text{stress at extreme} \\ \text{fibre where elastic} \\ \text{limit is reached first}\end{cases}$$

The intensity of the compression due to thrust $\Big\} = \frac{5220}{bd} = \frac{5220}{4d}$
$= 1305\frac{1}{d}$.

These two together must not exceed
$\frac{f_0}{S} = \frac{12,000}{S}$ = $\frac{\text{the ultimate strength in comp}}{\text{factor of safety}}$

$$\therefore \frac{3wc^2}{4d^2} + \frac{1305}{d} = \frac{12,000}{8} = 1500$$

$$\therefore \frac{3\times82\times48^2}{4d^2} + \frac{1305}{d} = 1500$$

$$\therefore \frac{d^2}{\cancel{862296}} + \frac{d}{\cancel{1305}} = \cancel{\frac{1}{1500}}$$

$$\therefore d^2 + \cancel{42.37}\,d = \cancel{33.86}$$

$$\therefore \frac{18432}{d^2} + \frac{435}{d} = 500$$

whence $d = 6\frac{1}{4}''$ nearly

Purlins

These are supported beams uniformly loaded, each with a distributed weight
$W = 7.5 \times 4 \times 50 = 1500$ lbs
Then c'' = half span $= \frac{7.5\times12}{2} = 45''$
b'' = breadth = 4''
d'' = depth
$w = \frac{1500}{7.5\times12} = \frac{150}{9} = 16\frac{3}{4}$ say 17 lb.
f_0 = modulus of rupture = 12,000 lbs

$$\therefore \frac{wc^2}{2} = \frac{\frac{f_0}{S}I}{y_0} = \frac{\frac{f_0}{S}\frac{1}{12}\times4\times d^3}{\frac{d}{2}} = \frac{f_0\times4d^2}{S\times6}$$

$$\therefore \frac{wc^2}{2} = f_0 d^2$$

$$\therefore \frac{17\times45^2}{2} = \frac{12000\,d^2}{12}$$

$$\therefore d^2 = \frac{17\times45^2}{2000} = 17.21$$

$$\therefore d = 4.15:$$

Limiting deflection to $\frac{1}{40}''$ per ft run or $\frac{7.5}{40}''$

$$\frac{7.5}{40} = \frac{u''Wc^3}{EI} = \frac{\frac{5}{48}\times1500\times45^3}{2400000\,\frac{1}{12}\times4d^3}$$

$$= \frac{5\times1500\times45^3}{48\times200000\times4d^3}$$

$$\therefore d^3 = \frac{2\;45^3}{40\times16\times1.5} = \frac{45^3}{960} = 93.9$$

$$\therefore d = 4.6 \text{ nearly}$$

or purlins may be $4'' \times 4\frac{1}{2}''$ as the weight allowed of 50 lbs per sq ft is rather in excess the framing being included

Suppose instead of using trusses the covering is laid on rafters at 2 ft interval carried on bressummers on the uprights.

Taking the same notation as before the scantlings of the rafters will be as follows.

Rafters. In the condition of supported beams uniformly loaded.

Let $\bar{b}''$ = breadth = ~~4~~'' 3'' 4''

$\bar{d}''$ = depth

c = half length $= \frac{15\times12}{2}$

$w = \frac{15\times2\times50}{12\times15} = \frac{1500\text{ lb}}{12\times15} = 8\frac{1}{3}$ lb

Then $\frac{wc^2}{2} = \frac{\frac{f_0}{8}\,\frac{\bar{b}d^3}{12}}{\frac{d}{2}} = \frac{f_0\,\bar{b}d^2}{48}$

$\therefore d^2 = \frac{wc^2}{2}\times\frac{48}{\bar{b}\times f_0} = \frac{8\frac{1}{3}\times90^2}{2}\times\frac{48}{3\times12000}$

$= 33.75$ ~~33.75~~ ~~15.68~~

$\therefore d =$ ~~3.74~~'' or ~~$\frac{…}{4}$~~'' ~~5.68~~'' nearly. 5.8''

for deflection

$\frac{15}{40} = \frac{\frac{5}{48}Wc^3}{EI} = \frac{\frac{5}{48}\times1800\times90^3}{2400000\times\frac{\bar{b}d^3}{12}}$

$\therefore \frac{3}{8} = \frac{5\times15\times90^3}{48\times24000\times\frac{d^3}{3}}$

$\therefore d^3 = \frac{15\times5\times90^3\times8}{48\times8000\times3}$

$=$ ~~…~~ ~~283~~ 500 = 330 nearly

or nearly 6''.9

Hence rafters should be 4'' × 7'' or 3'' × 8''

The Bressummers.

$w = \frac{7.5\times7.5\times50}{7.5\times12} = 31.25$ say 32 lb.

$c = \frac{7.5\times12}{2} = 45''$

$\therefore \frac{wc^2}{2} = \frac{\frac{f_0}{8}I}{y_0} = \frac{\frac{12000}{8}\times\frac{4d^3}{12}}{\frac{1}{2}d}$

$\therefore \frac{32\times45^2}{2} = \frac{12000\times4d^2}{8\times3}$

$\therefore d^2 = \frac{16\times45^2\times8\times6}{12000\times4}$

If $\bar{b} = 4''$

$d^2 = \frac{16\times45^2\times8\times6}{12000\times4}$

$=$ ~~21.6~~'' $= 32$

$\therefore d =$ ~~…~~'' 5.65''

For deflection at $\frac{1}{40}''$ per ft run

$\frac{7.5}{40} = \frac{\frac{5}{48}\times2812\times45^3}{24000\times\frac{1}{12}\bar{b}d^3}$

$\therefore \frac{1.5}{8} = \frac{5\times2812\times45^3}{48\times2400000\times\frac{1}{12}\bar{b}d^3}$

If $\bar{b} = 4''$

$= \frac{5\times2812\times45^3}{48\times200{,}000\times4d^3}$

$\therefore d^3 = \frac{5\times2812\times45^3\times8}{48\times200000\times4\times1.5}$

$= 176$

or d = 5.59 nearly

If $\bar{b} = 4''$ d^3 would $= 176$ ∴ $d = 5.59$ …

So that the bressummers would have to be

If trusses are used the total quantity of timber framing in the roof will be 821 c.ft costing all together 1038.12 Rs.

If ordinary rafters are used the total quantity of timber framing would be 818 c.ft costing Rs 874.50

This latter method would cheapen the stables somewhat but I think the construction hardly advisable as it would bring a lateral thrust on the pillars.

F. J. Romilly
LRL

5TH CIRCLE. Jackey Slet. No. 25

DIVISION Presidency STATION Bangalore LOCALITY Agram

Details and Estimate for Constructing Stables for 404 Hor

R. A.

REPORT.—General description of the Service proposed to be executed and condensed specification.

Report. The Chief Engineer has ordered this estimate to be prepared s to ascertain the cost of stables in the accompanying plan which ha approved of by his Excellency the Commander-in-chief.

General description. The stables are to be open. Each stall to be 12 feet long 7½ feet wide in the clear and to have a rear Verandah 4 feet wid No back wall – Partition walls to be of mud 6 feet high – Flooring rammed gravel sloping 6 inches from front to rear and sideway towards centre where granite slabs will be laid to carry off the dr to a rear V shaped drain – Roof to be coupled and tiled supporte on stone pillars.

Specification. The work is to be completed in a careful and workmanl manner and in accordance with specifications for Items No 13, 47, 67, 82, 32, 81, 55, 69, 105, 180, 80. in the schedule of rates f Bangalore for 1862-63.

Part of Building or Work.	Description of the Work to be performed and of the Materials and Labor required.	DIMENSIONS.				Contents.	CONTRACT OR ESTIMATED RATES.		Amount, Rs.	REMARKS.
		No.	L.	B.	D.		Schedule Item.	Price		
To	Excavation.									
Rear Stone pillars	Do	11	3	2	3	198				
Do walls	Do	10	6½	2	2	260				
Partition walls	Do	11	9¼	1½	1½	229				
Verandah pillars	Do	22	2½	2	3	330				
V shaped drain	Do	1	86	1	6"	43				
	Total C ft of excavation					1060	13	·52	5	

Part of Building or Work.	Description of the Work to be performed, and of the Materials and Labor required.	Dimensions. No.	L.	B.	D.	Contents.	Contract or Estimated Rates. Schedule Item.	Price	Amount, Rs.
	Concrete.								
To Rear Pillars	Do	11	3	2	3½	231			
Verandah Pillars	Do	22	2½	2	3	330			
Pillars at ends of partition walls	Do	11	2½	2	3	165			
		Total				726			
	Deduction								
	Concrete.								
Part of Pillars in rear	Do	11	1½	½	2½	21			
Verandah Pillars	Do	22	1	½	2	22			
Pillars at ends of Partition walls	Do	11	1	½	2	11			
	Total deductions					54.			
	Total C. ft of Concrete					672	47	2135	143
	Foundations								
	Stone in clay								
Partition walls	Do	10	8½	1½	1½	191			
	Total C. ft. of foundation					191	87	9·38	18.
	Foundations								
Back Wall	Do	10	6½	2	2½	325			
	Total C. ft. of Stone in chunam					325	82	12·50	41

Part of Building or Work.	Description of the Work to be performed, and of the Materials and Labor required.	Dimensions. No.	L.	B.	D.	Contents.	Contract or Estimated Rates. Schedule Item.	Price.	Amount, Rs.	Remarks.
	Superstructure									
Back walls	Do	10	8	1½	2½	300				
	Total C. ft. of brick in chunam					300	32	1719	52	
	Mud walls									
Partition walls	Do	11	9½	1	6	627	*	·03	19.	
	Total C. ft. of mud walls					627				
	Stone pillars									
Large in rear	Do	11	1½	(½)	11	182				
Do in front	Do	11	1	(½)	11	121				
Do at ends of partition walls and in Verandahs	Do	22	1	(½)	9	198				
	Total S. ft. Slabstones (6")					501	81	1·00	63.	
	V shaped drain									
In front	Do	1	86	1	6"	43				
	Total R. ft. of V shaped drain					43		·44	19	
	Plastering									
Rear walls	Do	10	8	·	7	560				
	Total plastering 2 coats of chunam Sqrs					5·60	55	2·31	13.	
	Plastering with mud.									
Partition walls	Do	11	9½	·	13	1359				
	Total Plastering with mud					1359		·57	7	

Part of Building or Work.	Description of the Work to be performed, and of the Materials and Labor required.	Dimensions.				Contents.	Contract or estimated Rates.		Amount, Rs.	Remarks.
		No.	L.	B.	D.		Schedule Item.	Price.		
	Roofing with pan tiles, chunam borders ridge and including teak reepers 2"×½" and nails &c.									
Roof in front	do	1	88	15½	"	1364				
Do in rear	do	1	88	10½	"	924				
	Total sqrs of roofing —					22·88	69	16·00	366	
	Wood work									
Bressummers	do	3	88	5½"	7½"	75-7-6				
Rafters large	do	58	15	3"	6"	108-9-				
do small	do	58	10	3"	6"	72-6-				
Collar pieces large	do	58	9	2½"	5"	45-3-9				
do small	do	58	5½	2½"	5"	27-0-5½				
	Total wood work cft —					329-10-6	105	2·75	904	
	Wood-oiling									
Bressummers	do	3	58	2⅙	"	377				
Rafters	do	58	15	1¼	"	1088				
Do small	do	58	10	1¼	"	725				
Collar pieces large	do	58	9	1¼	"	653				
do small	do	58	5½	1¼	"	499				
	Total Wood oiling squares					33·42	180	1·25	42	
	Gravelling									
Between partition walls	do	10	19½	7½	(6")	14·63				
	Total gravelling, watering &c squares					14·63		1·5	22	

Part of Building or Work.	Description of the Work to be performed, and of the Materials and Labor required.	Dimensions.				Contents.	Contract or estimated Rates.		Amount, Rs.	Remarks.
		No.	L.	B.	D.		Schedule Item.	Price.		
	Slab stones									
Between partition walls	do	10	7½	4	(3")	300				
	Total S. ft. of Slab stones (3") —					300	80	1·00	19	

Part of Building or Work.	Description of the Work to be performed, and of the Materials and Labor required.	Dimensions.				Contents.	Contract or Estimated Rates.		Amount, Rs.	Remarks.
		No.	L.	B.	D.		Schedule Item.	Price.		

5th Circle. No. of 188 -8 . Presidency Division.

38

Fund.—
Service Head.—
Departmental Head.—
Main Head.—
Sub-Head (*a*).—
Project of which the Work forms part (*a*).— Stables for Royal Artillery
Name of Work.— Constructing stables for 404 horses R.A.

Amounting to Rupees 72,720
To be carried out by the

No.	Sub-Head.	Quantity.	Rate.	Per	Amount	Total.
			Rs.		Rs.	
1	Excavation —— c.ft	1060	·52	100 cft	5	
2	Concrete —— „	672	21·35	„	143	
3	Foundation stone in chunam	325	12·50	„	41	
4	—— Do stone in clay ——	191	9·38	„	18	
5	Superstructure brick in chunam	300	17·19	„	52	
6	Mud Wall ——	627	·03	cft	19	
7	Slab Stone Pillars 6" thick Sft	501	1·00	8 Sft	63	
8	V. Shaped drain —— Rft	43	·44	Rft	19	
9	Plastering 2 coats —— sqr	5·60	2·31	Sqr	13	
10	—— Do Mud —— „	13·59	·50	„	7	
11	Roofing with pan tiles chunam borders, ridges and including teak reepers 2"×⅓" and nails &c —— Sqr	22·88	16·00	„	366	
12	Teakwood wrought and put up cft	329·106	2·75	cft	904	
13	Wood-oiling —— Sqr	33·42	1·25	Sqr	42	
14	Gravelling, watering, ramming sqr	14·43	1·50	„	22	
15	Slab stones 3" thick —— sq ft	300	1·00	16 Sft	19	
					1733	
	Contingencies				67	
	Total for 10 stalls ——					1800
	Total Rupees for 404 stalls ——					72,720

(*a*) These lines ~~will not be~~ required in the case of Minor Works and Repairs.

D. M[illegible] Lieut
A. Engineer

Chepauk,
188 .

Lieut.-Colonel, R.E.,
Executive Engineer, Presidency.

Colonel, R.E.,
Superintending Engineer, 5th Circle.

Rs. 180 per stall

No. of 188-8

BUILDINGS AND ROADS.

5TH CIRCLE

DIVISION Presidency

STATION Bangalore

LOCALITY Agram

Abstract of Estimate framed by
Lieut. D. Falvey
for Constructing Stables
for 404 horses R.A.

E I

Report.

Reason for submission of Report.

1. At a board held at the Residence of the Lt. General commanding at Bangalore on the morning of 31st July, plans for covered stables for the R.H.A at Bangalore were examined, & the Lt. General as President of the board was pleased to direct me to look into the plans and estimates under consideration and report upon them.

2. The plans & estimates are four in number, viz

Plans &c to be reported on

III. Plan A. for a corrugated iron roofed shed built at Kirkee and supported on cast iron pillars, and said to have cost Rs 271 per horse.

IV. Plan B. for a some what similar shed with ordinary tiled roofing supported on timber queen post trusses built at Poona & said to have cost Rs 132 per horse.

II. Plan C, for a shed with an ordinary coupled roof carried on stone uprights & providing for shelter to two rows of horses picketted on either side of a 6 ft central gangway Pl~~and~~ & estimated to cost Rs 102 per horse.

I. Plan E, for a similar shed to C but giving cover to a single row of horses only with a gangway in rear and estimated at Rs 180 per horse

Plan $\overset{\text{IV}}{\text{B}}$ has been estimated for by a local contractor who calculates the cost at Rs 125 per horse.

3. At the first sight it would seem that plan E is the most expensive plan of the four with perhaps no compensating advantages to recommend it above the others. While however the 3 first plans appear to provide cover equally for the horses, in the estimate for the last one plan E are included items for flooring, good drainage, partition walls dividing the stalls laterally, and low pucka dwarf walls along the outside to prevent drainage from the surface finding its way into the stalls, all of which items help to swell the estimate, & all are in my opinion essential with the exception perhaps of the partition walls.

Plan E compared with the other plans

4. I would observe that plans $\overset{\text{II}}{\text{C}}$ & $\overset{\text{I}}{\text{E}}$ are practically the same, the nature of the cover afforded to the horses is the same in each case, and plan C is the form that plan E would be modified to were it decided to picket the horses in double lines.

Plans C & E practically the same

5. In all four plans the stalls are open to either side, & if the additional items included in plan E are added to the other plans the cost per horse will not be found to differ so greatly from that for plan $\overset{\text{I}}{\text{E}}$.

All plans similar in being open at sides

Estimate for plan C insufficient.

6. I have examined the estimate for plan $\overset{\text{II}}{\text{C}}$ prepared for Colonel Tidard R.H.A & find that the rates allowed are identical with those in use in the P.W. office here. I consider however that the scantlings allowed for the timbers are too weak, & no provision is made for pa- tering the beams by wood oiling nor is any allowance made for contingencies. I am sure these stalls could not be properly built at Rs 102 per horse. If the stables are constructed on this plan with proper flooring, drainage arrangements on the cost would be Rs 140 per horse

Estimate for plan B insufficient.

7. On looking into the estimate for plan $\overset{\text{IV}}{\text{B}}$ by a local contractor and giving the cost per horse on this pattern at Rs 125, I find the estimate insufficient. The mistake has been made of calculating the cost of the timber for the trusses at the same rate as that for ordinary couple framing when little or no framework is required. The rate in the latter case is Rs 2.75 per cft while for timber framed in trusses the rate last year here was Rs 5.5 & now I am informed can barely be procured at Rs 4.5 per c.ft. I have prepared an estimate myself for this style of stable, & find that if the framing for

the trusses can be worked up at the lower rate of Rs 3.5 per c.ft the cost per horse would be Rs 150 of which Rs 142 would be for roof covering alone. while if the higher rate of Rs 4.5 is necessary the cost per horse would come to Rs 208 including proper flooring, drainage arrangements, &c. No provision for side partition walls nor outside dwarf walls is made in this Estimate

Arrangement of plan C contains an element of danger

8. There is a point connected with plan $\overset{\text{II}}{\text{C}}$ which I think deserves serious consideration. It will be observed that the two central rows of uprights that support the roof are placed midway between each picket. These pillars are merely 6" stone slabs, & a horse if able to lean against one of these with his whole weight might easily thrust it out of the perpendicular sufficiently to bring the bressummers above off their bearings, while a horse falling against one of these pillars, or repeatedly kicking it might very possibly break it. Either of these accidents, but more particularly the latter would result in the collapse of the roof over about 4 stalls & possibly more, & cause serious if not fatal injuries to the men & horses beneath at the time. In plan $\overset{\text{I}}{\text{E}}$ it will be seen that such an accident is impossible the horses being placed out of reach

the roof supports.

Data wanting to enable plan A to be Estimated.

9. I regret that I am unable to give an Estimate for the roof on plan $\overset{\text{III}}{\text{A}}$, but there are no data in the P.W. Offici from which I can deduce the cost of the various description of iron wo involved. To prepare an Estimate it would be necessary to send up the plans of the iron work to the Napie foundary at Madras or the P.W. Shop there & ascertain the cost at which they would make up the several parts. I think the cost given for the stables as erected at Kirkee would be a low standard as compared wit the cost that would obtain here, for far as I can judge iron work is much more extensively used in Bombay th in Madras & the work here would certainly be costly. I am of opinion that such stables built here would come to very little under Rs 300 p horse. The cost would be materia decreased by substituting stone pill in place of the cast iron uprights to support the trusses.

F. J. Romilly
Lt R.E
Ex. Engr.

Bangalore
2nd Aug 1882.

Report
on
Plans of Stables
proposed to be
built at
Bangalore

DP 2-32'
8

List of Plans and estimates accompanying proceedings of Committee assembled at Bangalore on the 31st July 1882 to consider the subject of Stabling for the Royal Artillery.

1. Tracing plan marked A. III ✓
1. Tracing plan marked B. IV. ✓
2. Estimates for same - one framed by a Native Contractor, the other by Lt. Romilly R.E. ✓
1. Plan marked C. II ✓
1. Estimate for same
1. Plan marked E. I
1. Estimate for same
1. Plan marked "C. II. modified"
1. Estimate for same
1. Specification report to accompany plans B. IV and C. II.
1. Report on plans A. B. C. E. by Lt. Romilly R.E. ✓

E. [illegible] Lt Col
A. Q. M. G.

Bangalore
18th August
1882

Proceedings of a Committee assembled at Bangalore on Monday the 31st July 1882, by order of Lt. General Payn C.B. Commanding Bangalore Division

President
Lt. General Payn C.B.
Commd. Bangalore Division

Members
Lt. Colonel Russell
Comd. 12th Royal Lancers
Lt. Colonel Villard
Comd. E/B R.H.A.
Lieut. Romilly R.E.
Colonel Swainston A.Q.M.G.
Vety. Surgn. Anderson
" " Smith
} In attendance

The Committee having assembled, the President intimates that the subject to be considered, is that of stabling for the horses of the three batteries of Royal Artillery, quartered at Bangalore.

Several proposals have been submitted to the Commander in Chief for adoption - these will be considered each on its own merits, and the

Committee will have to express an opinion, as to which best meets the desired end - due regard being given to cost.

The following plans are placed before the Committee

I. As proposed by Colonel Sankey R.E. Estimated cost per stall Rs 180-..-..

II. As proposed by Colonel Tillard R.E.

III. That of the corrugated iron stabling of R.A. at Kirkee

IV. That of tiled stabling of the Body Guard of the Governor of Bombay at Poona.

The several plans having been discussed, it is decided that estimates for plans II. III. & IV be prepared by Lieut Romilly R.E. when the Committee will be in a better position to arrive at a satisfactory conclusion.

The Committee adjourns until such date as the estimates may be reported ready.

Bangalore 7th August 1882

The Committee having re-assembled agreeably to decision at adjournment on the 31st ulto.

Lieut Romilly R.E. reads a report drawn out by himself, on the several plans - estimates for which he was instructed to prepare.

On this report, the Committee decide to throw out the proposal of Stables ~~of~~ on Plan III.

Iron stabling as at Kirkee

As regards proposal II there appears a great drawback in the possibility of a horse pushing the inner up-rights out of the perpendicular - or breaking them in two by a kick - either of which contingencies would cause probable fatal consequences.

Lt. Col. Tillard's plan construction estimate Rs 132-..-.. per horse
Lt. Romilly's estimate Rs 140-..-.. per horse

The placing the inner up-rights four feet farther inwards would remove the drawback but by so doing only eleven feet of standing per horse would be obtained, which in the opinion of the Committee is not sufficient.

It is roughly estimated that, alterations in the construction as suggested would raise the cost to nearly that of plan IV.

Lt. Romilly will however prepare fresh plan, and cost an estimate for the same.

With reference to proposal I, the Committee consider stone slabs on the flooring - and partition walls between the horse standings - quite a mistake - whilst the necessity of the dwarf wall along the front is not apparent. Striking the cost of these three items out of the estimate, Lt. Romilly approximates the cost at about Rs 140 —— per horse. The horses being in single rows, become entirely exposed to wind and rain, all along their front. To protect them therefore a wall along the front of the standings would be essential - this would necessitate a certain amount of ridge ventilation - adding to the cost of the stables.

Col. Sankey's plan estimated by P.W.D. to cost Rs 190 —— per horse

Body Guard Stables Poona
Cost there Rs 132 —— per horse.
Cost under estimate Bangalore - Rs 125 —— and Lt. Romilly's Rs 150 to Rs 208 —— per horse

The Committee consider a row of stabling of this kind a mistake, and are not prepared to recommend it.

Proposal IV is that, which the Committee unanimously most strongly recommend for adoption. as meeting in the most desirable manner the wants of troop stables: viz absence of all uprights by which damage might accrue to a horse. ample ventilation - and cover.

Lt. Colonel Tillard, who has experience of stables of this kind, speaks most highly in their favor.

The Committee adjourn, until such date as Lt. Romilly can prepare plan and estimate of proposal II as modified.

Bangalore 18th August 1882

The Committee having re-assembled agreeably to decision at adjournment on the 7th instant. Lieut Colonel Tillard R.H.A. and Vety Surgeon Anderson A.V.D. being absent, the former having proceeded to England, the latter to Egypt. Consider the plan and estimate of a modified form of proposal II for stables.

Lt Romilly explains that at first sight the use of corrugated iron which he has introduced for roofing purposes, would appear to add considerably to the cost as compared with tiles – but the great saving in timber, which the use of iron roofing renders practicable, nearly if not quite compensates for the extra cost of the iron – And further the cost of repairs to iron roofing, as compared to the cost of repairs to tiled roofing as carried out at this station, is roughly estimated at a saving of 70 per cent.

The plan now under consideration is estimated to cost Rs 137-8-" per horse, and whilst being the least expensive of the several proposals submitted, appears to embody all the good points in plan IV

"Modified form of proposal II Costing Rs 137-8-" per horse – as planned and estimated by Lt Romilly R.E. at suggestion of the Committee"

and consequently is recommended for adoption in preference to that owing to its smaller cost.

W Mayne M General
Commanding Bangalore Division
President.

J. C. Russell Colonel
Commanding 12th N. Lancers
Member.

Bangalore
18th August 1882.

P.G. d. 5772
PMD
30-5-82

Proceedings of a Committee on R. A. Stabling Bangalore

Bangalore 18th August 1882

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14 No. 382 No. 298

No.

Read the following paper:—

~~GOVERNMENT OF MADRAS.~~

MILITARY DEPARTMENT,

28th September 1882, No. 5172,

Military Buildings—Stables.

Read the following ~~paper~~ :—

~~No. 382.~~ *From Lieutenant-Colonel J. EWING, Officiating Quartermaster-General, to Colonel E. L. HANKIN, Acting Secretary to Government, Military Department; dated Ootacamund, 15th September 1882, No. 1007.*

Vide G.O. 1956 W 2.9.82

With reference to this office letter, No. 484, dated 21st June 1882, embodied in Proceedings of Madras Government, No. 4320, dated 14th August 1882, on the subject of providing proper stabling accommodation for Government horses in this Presidency at a cost of Rs. 70 per stall, Sir Frederick Roberts desires me to state for the information of Government that, under His Excellency's instructions, the question of the cheapest and best kind of stabling has been most carefully considered and worked out by a Committee at Bangalore, the Proceedings of which His Excellency directs me to submit herewith.

2. The cost of the cheapest plan of stabling, which is estimated at Rs. 137-8-0 and recommended by the Committee, is more than the Commander-in-Chief hoped it would be, but there can be no doubt that, in the long run, corrugated iron roofs, of which the above plan of stabling is to consist, will prove infinitely the cheapest.

3. Sir Frederick Roberts, therefore, hopes that Government will strongly recommend to the Government of India the proposals for the construction of proper stabling for Government horses in this Presidency. There is a strong consensus of opinion in favor of stables for Government horses in this part of India, and His Excellency has reason to believe that the proposal will receive the support of the Commander-in-Chief in India.

4. A list of plans, estimates, &c., connected with the Proceedings of the Committee, is attached thereto, all of which I forward herewith.

~~No. 383.~~ ORDER ~~THEREON~~ dated, 28th September 1882, No. 5172.

Approved and transferred to the Public Works Department, for inclusion in the Budget for 1883-84.

(True Extract.)

Sidney Laffan

For Ag. Secretary to Government,
Mily. Dept.

To the Public Works Department, with 14 enclosures.
" Quartermaster-General.
" Adjutant-General, for information.

Exd. A. Raitt.

39

G.O. No 1955 W. 2-8-
G.O. No 1956 W. 2-8-82.
G.O. No $\frac{2470}{A}$ W. 22-9-82
G.O. No 2277 W. 5-9-82

W.C. No 6

Govt. of {1882} Madras.

MILITARY.

To

THE PUBLIC WORKS DEPARTMENT,
&c., &c., &c.

Dated September, 28th.

Issued

Recd. 7/10 *Encl.* 5

G.O., 28th September 1882, No. 5172.

SEPTEMBER.
Nos. 382-383.

Military Buildings—Stables.

Plans and Estimates for the provision of 404 stalls for Government horses, amounting to Rs. 72,720, approved.

No 2985 w

PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT,

UNDER date the 13th Novr/52

Read the following:—

Proceedings - Military Dept (H.E. No 5172 d/28th September/

Communicated to the Superintending Engineers, Third Fourth and Fifth Circles, who will estimate for the requisite stable accommodation at Bellary, St. Thomas' Mount, and Bangalore, on the plan approved by the Committee, which will be lithographed and circulated for information. Copies of the plan will also be furnished to the Military in view to such action as may be necessary being taken in regard to the Military stations of Kamptee and Secunderabad, which are beyond the territorial limits of the Madras P. W. Department.

2. The Superintending Engineers concerned will at once report the approximate amount to be provided in the outgoing Military Works Budget for stabling at Bellary, St Thomas' Mount, and Bangalore; and will as soon after as practicable submit for sanction estimates in

the regular form.

W/49

8

Superintending Engineers
Third, Fourth & Fifth Circles } with copies of Slum
Military Dept. 31

X despd 5-12-82.

despd 18-21/11-82.

R.S.

~~The Hon M C [illegible]~~

~~H. E. the Com C~~

LB 13/11

93/57

8 [illegible]

Govt. of 1881

PUBLIC WOR

To

Print and

14/11/82

Dated

Issued

Recd.

Encl.

G. O., 13 Nov. 1882 No. 29B.

Nos. 86 & 87

Stables.

The approximate amount
equired to be provided f
n the Mily: Works Budg
on account of — at Be
St. Thos' Mount & Bangalor
to be reported by the S. E
concerned and Estimate
orders to be submitted
in due

Enter in Receipt Regis