

(1) Number of pages 1-20
(2) Date of repair _____
(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 53.	Press Mis.
105-106	
Dated 8-1-	1869

Not to be folded or roughly handled

PS

*Proceedings of the Madras Government, Public Works Department,
8th January 1869.*

No 105 Read the following Circular from the Government of India, Public Works Department, (Military Works,) to the Secretary to the Government of Madras, Public Works Department, dated Simla, 2nd November 1868, No 94 —

With reference to Public Works Department Circular No 57, dated 22nd June 1865, on the subject of the advisability or otherwise of raising barrack buildings on vaulted basements, I am directed to forward, for information and guidance, copies of the correspondence with the Secretary of State on the subject as noted on the margin, and to request that the recommendations of the Army Sanitary Commission, as contained in the last paragraph of their Memorandum in regard to the character of the sub-soil and the amount of moisture in it, may invariably be complied with, when plans for barracks and hospitals and other important buildings intended as habitations, are submitted for the orders of the Government of India.

(Signed) J. W. ALEXANDER, C E,
Offg Asstt Secy to the Govt. of India

Circular from the Secretary to the Government of India, Public Works Department, to all Local Governments and Administrations, dated 22nd June 1865, No 57

1 The Commission appointed in England to enquire into the sanitary state of the Indian Army, having recommended that "all future barracks be erected on raised basements with the air circulating under the 'floors,' " I am directed to request that, in view to enable the Government of India to give the matter due consideration, Executive Engineers may be instructed to open out two or three floors in each range of barrack buildings at every station, both before, after, and in the middle of the rainy season, and to report whether the floors are liable to be affected by damp during the rainy season. Care should be taken in the examination to detect whether any damp that may be apparent is due entirely to the weather and the soil, or in part to washing of floors, the height of the floor above the level of the ground should be stated in each case.

2 Specific reports should at the same time be obtained from the Military and Medical Authorities, as to whether the floors are found by them to become damp at any of the stations in any of the existing barracks during the rainy season.

3 The reports in question, when complete from all stations, should be submitted to this Office, with the remarks of the
upon the general question of the advisability or otherwise of raising barrack buildings on vaulted basements, due consideration being given to the expense that the measure would involve.

Proceedings of the Madras Government, Public Works Department,
8th January 1869.

MILITARY

Abstract of replies received from Local Governments and Administrations to Public Works Department Circular No 57 of 1865, having reference to the question of the advisability or otherwise of raising Barrack Buildings on vaulted basements

Views of Local Governments and other authorities upon the general question of the advisability or otherwise of raising Barrack Buildings on vaulted basements	Instances of dampness detected in Barrack floors	To what causes attributable	Height of floors from ground level	Remarks
His Excellency the Commander in Chief is of opinion that as Government have decided on adopting a principle of construction involving double storeys, no necessity exists for the arched "basements"	"	"	"	The opinion of the Inspector General of Hospitals, Her Majesty's British Forces, is quoted by His Excellency in corroboration of his view
The Government of Madras are of opinion that the adoption of vaulted basements in that Presidency is not necessary, as the reports received from the Local Authorities show satisfactorily that a moderate elevation of flooring is amply sufficient to ensure dryness	Infantry Barracks, Madras Depot ditto, Poonamallee Infantry do, Trichinopoly No 5, block of barracks and the Wellington solitary cells Foot Artillery Barracks, Bangalore Ditto ditto, Cannanore Infantry Barracks, ditto	Either the spilling of water upon the floors, or the extreme humidity of the climate Faulty construction of flooring Either the spilling of water upon the floors, or the humidity of the climate	"	The Superintending Engineer, 5th Division, states that in all cases where the basement is sufficiently raised, the damp will be found due to washing of floors, and not to soil or weather
The Bombay Government state that raised floors would be of great advantage in low countries, and that if the expense is not to be considered, it would be well to apply them to all Stations, doing so in the first place to low countries	Artillery Barracks, Baroda Two Infantry, and one Artillery Barrack, Deesa and Aboo Infantry Ponds, Dharwar Old place of arms, do	Unknown	2 feet	Re examined subsequently, and dampness found to exist in one of the barracks only Earth taken from ground level, found somewhat damp only At a depth below 3 feet At a depth of 2½ feet.
The Local Authorities of the North Western Provinces, including the Local Government, appear to be entirely averse to the introduction of vaulted basements. The Local Government on its own part adds that, unless care be taken to prevent noxious matter collecting in vaults under buildings, bad consequences must arise from them, and that unless they be tolerably lofty, there would be great risk of their not being kept perfectly clean. The Official Superintending Engineer, 2nd Circle, gives it as his opinion that, if Barracks are raised to a height of 2½ to 3 feet above ground, vaulted basements are unnecessary	Barracks, Pandeypoor and Scroole * Infantry Barracks, Bareilly Infantry, Cavalry, and Artillery Barracks, Meerut Roorkee Barracks, Sappers Cawnpore single storied Barracks Jhansi Artillery Barracks, as well as Infantry Arra Barrack verandahs (Infantry Lines)	Weather and soil Spilling of water upon the floors, or some other accidental cause Faulty construction of flooring Moisture in the wet season, combined with the washing of floors Probably to the rains	18 inches or 1 foot on an average 3 to 4 feet From 9 to 19 inches on an average 2 feet 3 inches 4 feet 3 feet on an average 12 inches on an average	Sub soil only found damp, but not the floors themselves, the floors of two barracks at each of the Stations were only opened out * One or two only found damp, and after rains No complaints of dampness were ever made by the occupants, ground below floor found damp only, the general conclusion arrived at in regard to Meerut was, that no dampness sufficient to cause sickness was apparent anywhere Damp at a depth of 15 inches Soil in foundations damp Floors damp during rainy season Damp during rains

Proceedings of the Madras Government, Public Works Department,
8th January 1869

Abstract of replies received from Local Governments and Administrations, &c —(Contd)

Views of Local Governments and other authorities upon the general question of the advisability or otherwise of raising Barrack Buildings on vaulted basements	Instances of dampness detected in Barrack floors	To what causes attributable	Height of floors from ground level	Remarks
The opinion of the Punjab Government is that, firstly, raised hollow basements are not required, secondly, that floors should never be less than from 2 to 3 feet from the ground, and, thirdly, that the space below floors should be solid and filled up with sand or gravel. The Local Authorities are unanimous in opinion that vaulted basements are unnecessary	Inner verandah of one Artillery Barrack, Peshawar Two Barracks, Nowshera and Dera Ismael Khan Phullour Barracks Lahore Fort barracks (old) Govindghur Cantonment Barracks (old)	To its proximity to the Soldiers' garden To a wash house being in the barrack To insufficient height of floors? To heavy rains To rains	2 feet 6 inches From 9 inches to 7 feet 1 foot	Ground below a depth of 2 feet rather damp Examined to a depth of 4 feet Damp after rains Damp in the middle of the rains only
The Chief Commissioner, Central Provinces, states that as all barracks are in future to be built of more than one storey, the question raised by the Commission is set at rest, but that were it not so, he would certainly recommend that all single storied buildings in the Central Provinces should be built on raised basements, having the air circulating under the floors	Asseergurh Barracks	To the driving mist around the hills	"	Slightly damp during rainy season only, and not productive of any inconvenience
The Chief Commissioner of Oudh is of opinion that vaulted basements are quite unnecessary in Oudh, where the barrack floors are well raised	"	"	2½ to 3 feet	The Barrack floors in Oudh are reported to be perfectly dry even in the height of the rains
The Governor of the Straits Settlements, strongly advocates the construction of new barracks in the Straits upon vaulted basements, sufficiently high to admit of an arcade being formed below the flooring, in which the men could obtain exercise at all seasons and hours, being duly sheltered both from sun and rain	Singapore Native Infantry Barrack Port Canning Artillery Barracks	To the general moisture at certain times in the atmosphere, rather than to any actual defect in floorings	3 feet	Floors damp during rainy season Floors damp after rain No complaints have ever previously been made of these barracks
The Inspector General of Hospitals, Hyderabad Subsidary Force, recommends, as a matter of Sanitary economy that barracks be built of two storeys, the upper to be the dwelling place, and the lower to be used for Regimental buildings, &c &c. The Resident observes that, as it has been determined by Government that all the new barracks to be built in future at Tumkurgherry shall be double storied, except the few required to accommodate the 2nd European Regiment, and that as none of the floors of the existing buildings get	"	"	"	None of the barrack floors at Stations in Hyderabad have been reported to be damp

*Proceedings of the Madras Government, Public Works Department,
8th January 1869.*

Abstract of replies received from Local Governments and Administrations, &c — (Contd)

Views of Local Governments and other authorities upon the general question of the advisability or otherwise of raising Barrack Buildings on vaulted basements	Instances of dampness detected in Barrack floors	To what causes attributable	Height of floors from ground level	Remarks
damp during the rains, the question raised by the Commission, as far as Hyderabad is concerned, is set at rest. The whole of the Authorities in Hyderabad, both Military and Medical, are unanimously of opinion that barracks should be built in double storeys				
The Agent, Governor General, Central India, concurs with the Superintending Engineer, Rajpootana Circle, in opinion that vaulted basements are quite unnecessary in Upper India, the Punjab, Central India and Rajpootana, and that a plinth of 3 feet above the level of the ground filled in, is all that is required to ensure the floor being perfectly free from damp, either from the weather or the soil.	Indore Barracks	To washing of floors	2½ feet	The floors become damp during the rainy season
The Agent, Governor General, Rajpootana, concurs with the Superintending Engineer, Rajpootana Circle, in considering it wholly unnecessary to raise barrack floors on vaulted basements, and recommends that floors be raised 3 feet above the ground, and made of stone laid in mortar, and that plinths should invariably be filled in with rammed kunkur, moorum, or gravel	Neemuch temporary Barracks	To the weather, soil, and washing of floors	About 16 inches on an average	The Superintending Engineer strongly urges the construction of sub soil drains round buildings, at about 20 feet distant, under surface only, found slightly damp
The Bengal Government apparently prefers floors raised on arches 3 feet from the ground to solid ones. The Officiating Superintending Engineer, Presidency Circle, estimates the cost of one of these floors, exclusive of foundations, to be about 5 Annas per foot more than a solid one of the same kind, but the Local Government considers that the advantages of raised floors in Bengal quite justify this additional outlay in the principal barrack buildings. The Garrison Engineer is of opinion that raised floors on arched basements are drier than solid basements, especially if a layer of asphalt be laid in the walls and piers. The Superintending Engineers of the Barrackpore and Dinapore Circles recommend vaulted basements, and the	Fort William— Dalhousie Barracks	Not stated	On ground level 2 feet 3 inches thick. A few inches only 1 foot	Brick work under flags only damp
	North Barracks South Regimental Hospital	Ditto Ditto Ditto		Not occupied as sleeping rooms. Has a low basement, and is not intended for occupation during rains
	Barrackpore, temporary Barracks Dum-Dum, Barrack and Hospital Chinsurah, Barrack Dacca, Hospital Dinapore, Artillery Barrack	Ditto Ditto Ditto Ditto Ditto	2 feet 2 feet 6 inches 3 inches on east, and 8 inches on west side 6 inches on north, and 1 foot on south side	Under stones, mortar included Below kunkur, &c
	East Infantry Barrack	Ditto		

*Proceedings of the Madras Government, Public Works Department,
8th January 1869.*

Abstract of replies received from Local Governments and Administrations, &c — (Conclud)

Views of Local Governments and other authorities upon the general question of the advisability or otherwise of raising Barrack Buildings on vaulted basements	Instances of dampness detected in Barrack floors	To what causes attributable	Height of floors from ground level	Remarks
Superintending Engineer, Berhampore, either arched floors or floors supported on iron girders. For barracks in Assam, floors well raised above the surface of the ground, to admit of a free circulation of air beneath, are recommended. The Deputy Inspector General of Hospitals, Dinapore, thinks that no change is required in the present barrack floors, but suggests planked flooring for hospitals generally	European General Hospital	Not stated	4 inches on north, and 1 foot on south side	Whole floor damp The general opinion is, that in Bengal floors are not dry unless raised 3 feet from the ground on arched flues

From the Government of India, to the Secretary of State for India, dated 13th March 1868, No 41

- The Army Sanitary Commission, in their "Report" and "Suggestions"† in regard to barrack construction in India, have recommended "that all future barracks be erected on raised

* Pages 101 to 104 and 164

† Page 19

basements with the air circulating under the floors"

2. It has been the practice in India generally to construct barrack buildings on solid floors, raised from 2 to 4 feet above the level of the ground, and it has not been customary, except in damp climates and so is like those of Bengal, to arch the basements, so that the air may circulate under the floors

3. The objections that have generally been urged against vaulted basements are, that they are troublesome to construct, that they add very considerably to the cost of a building, and that, unless sufficiently high to admit of men passing readily within them for the purpose of keeping them clean, vegetation is apt to spring up, even if paved flooring be given; the basements, moreover, harbour vermin, and become the receptacles of rubbish and filth.

4. In order, however, that the matter might be fully taken into consideration with special reference to the recommendation of the Army Sanitary Commission, we issued a Circular to Local Governments and Administrations, requesting that Executive Engineers might be instructed to open out two or three floors in each range of barrack buildings at every station, both before, after, and during the middle of the rainy season, and to report whether the floors had been affected by damp during the rains, care being taken in the examination to discern whether any damp that might be apparent was due entirely to the weather and the soil, or in part to washing of floors. It was also requested that specific reports as to the desirability or otherwise of adopting vaulted basements should at the same time be obtained from the Military and Medical Officers at the different stations

5. Reports from the various Governments and Administrations have duly been received by us, and we have now the honor to forward an abstract of them for the information of Her Majesty's Government

*Proceedings of the Madras Government, Public Works Department,
8th January 1869*

6 The Reports include several temporary barracks, the floors of which are only raised slightly above the level of the ground, and the majority of the instances in which dampness is noticed, relate to these

7 On the whole, it appears to us, both from former experience, and from the information now gathered, that, except in certain damp localities and climates, there is no necessity for incurring the heavy additional expense that will be involved in raising the barracks on vaulted basements, particularly as all the dormitories will, in future, be on upper-stories

8 We consider that, as a rule, it will be sufficient to rise the barracks on solid plinths not less than 3 feet in height. In exceptional cases, however, (to be determined by the Government of India) we think that vaulted basements should be given to the barracks as already authorized in the case of those to be erected at stations in the Province of Bengal.

From the Secretary of State for India, to the Government of India, dated 16th September 1868,
No 29

With reference to the Despatch of your Excellency in Council, dated 13th March, No 41 of 1868, (Public Works Department,) on the subject of barrack construction in India, I forward herewith, for your consideration, copy of a Memorandum received from the Army Sanitary Commission, which will be found to be substantially in accordance with the views expressed by your Excellency in Council

Memorandum by the Army Sanitary Commission, on India Public Works Despatch No 41, dated 13th March 1868—Barrack construction in India

At page 19 of our suggestions for improving the sanitary condition of Indian Stations, the principle is laid down that barracks should be raised on arched basements. The object of this precaution is two-fold—1st, to raise the building generally above the influence of ground damp, whether in sub-soil or air, 2nd, to add to the height of the blocks in order that the men's sleeping rooms should be as much raised above the ground as possible, so as to diminish any risk of malaria

The principle like all others is a general one which requires to be adopted to local peculiarities. This is the view which the Indian Government has taken of it, and in this the Commission concur

They would again point out that in all low, flat and water-logged sub-soil localities in India, it would be absolutely necessary to introduce raised basements, while on well-drained or naturally dry sub-soils where there are sleeping rooms only on upper-floors of barracks, a raised basement might be dispensed with. The principle can only be applied or left unapplied in any district after careful local enquiry, and it might be well that in all reports on sites for new barracks the character of the sub-soil and amount of moisture in it, that is the depth from the surface at which water stands in a well or trial shaft during the wet season, should be stated, in order that the principle of basement elevation may be applied if seen to be necessary

J HOPE GRANT,
Quarter Master General
DOUGLAS GALTON
JOHN SUTHERLAND
H H MASSEY
B H MARTINDALE
PROBY T CAUTLEY.
J R MARTIN
ROBERT RAWLINSON.
COLONEL MURRAY, (on leave).

WAR OFFICE,
8th August 1868.

J. J. FREDERICK,

Secretary

*Proceedings of the Madras Government, Public Works Department,
8th January 1869*

No. 150, dated 22nd October, 1868

Endorsed by Home Department

Transferred with the enclosure to the Public Works Department

No 106

ORDER THEREON, 8th January 1869, No. 53

MILITARY WORKS, No. 7.

Communicated to the Military Department, and to the Superintending Engineers for information and guidance

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To the Military Department
.. Superintending Engineers
To Captain R. B. Kennedy

Exd S T Augustin

Govt. of 1869 Mys. Indras.

PUBLIC WORKS.

To

THE MILITARY DEPARTMENT

40, 40, 40

Date 1 January, 8th

Recd

G O, 8th January 1869, No 53

JANUARY.

Nos. 105-108

Barracks and Hospitals—Circular from the Government of India, requesting that, in future, certain information may invariably be furnished when submitting plans for barracks and hospitals, and other important buildings intended as habitations, communicated to the Department and Officers concerned

Enclosure to Circular No. 94 Public Works.

No 41, dated 13th March, 1868

From—The Government of India,

To—The Secretary of State for India

The Army Sanitary Commission, in their "Report"* and "Suggestions"† in regard to barrack construction in India, have recommended "that all future barracks be erected on raised basements with the air circulating under the floors."

* Pages 101 to 104 and 164
† Page 19

2 It has been the practice in India generally to construct barrack buildings on solid floors, raised from 2 to 4 feet above the level of the ground, and it has not been customary, except in damp climates and soils like those of Bengal, to arch the basements, so that the air may circulate under the floors

3. The objections that have generally been urged against vaulted basements are, that they are troublesome to construct, that they add very considerably to the cost of a building, and that, unless sufficiently high to admit of men passing readily within them for the purpose of keeping them clean, vegetation is apt to spring up, even if paved flooring be given, the basements, moreover, harbour vermin, and become the receptacles of rubbish and filth

4 In order, however, that the matter might be fully taken into consideration with special reference to the recommendation of the Army Sanitary Commission, we issued a Circular to Local Governments and Administrations, requesting that Executive Engineers might be instructed to open out two or three floors in each range of barrack buildings at every station, both before, after, and during the middle of the rainy season, and to report whether the floors had been affected by damp during the rains, care being taken in the examination to discern whether any damp that might be apparent was due entirely to the weather and the soil, or in part to washing of floors. It was also requested that specific reports as to the desirability or otherwise of adopting vaulted basements should at the same time be obtained from the Military and Medical Officers at the different stations.

5. Reports from the various Governments and Administrations have duly been received by us, and we have now the honour to forward an abstract of them for the information of Her Majesty's Government

6. The Reports include several temporary barracks, the floors of which are only raised slightly above the level of the ground, and the majority of the instances in which dampness is noticed, relate to these.

7. On the whole, it appears to us, both from former experience, and from the information now gathered, that, except in certain damp localities and climates, there is no necessity for incurring the heavy additional expense that will be involved in raising the barracks on vaulted basements, particularly as all the dormitories will, in future, be on upper-storeys

(2)

8. We consider that, as a rule, it will be sufficient to raise the barracks on solid plinths not less than 3 feet in height. In exceptional cases, however, (to be determined by the Government of India) we think that vaulted basements should be given to the barracks as already authorized in the case of those to be erected at stations in the Province of Bengal.

Circular No 57, dated 22nd June, 1865

From—LIEUT-COLONEL C. H. DICKENS, R. A., Secy to the Govt of India, P. W. Dept.,
To—All Local Governments and Administrations

The Commission appointed in England to enquire into the sanitary state of the Indian Army, having recommended that "all future barracks be erected on raised basements with the air circulating under the floors," I am directed to request that, in view to enable the Government of India to give the matter due consideration, Executive Engineers may be instructed to open out two or three floors in each range of barrack buildings at every station, both before, after, and in the middle of the rainy season, and to report whether the floors are liable to be affected by damp during the rainy season. Care should be taken in the examination to discern whether any damp that may be apparent is due entirely to the weather and the soil, or in part to washing of floors, the height of the floor above the level of the ground should be stated in each case.

2 Specific reports should at the same time be obtained from the Military and Medical Authorities, as to whether the floors are found by barracks during the rainy season

3 The reports in question, when complete from all stations, should be submitted to this Office, with the remarks of the upon the general question of the advisability or otherwise of raising barrack buildings on vaulted basements, due consideration being given to the expense that the measure would involve.

(3)

MILITARY

Abstract of replies received from Local Governments and Administrations to Public Works
Department Circular No 57 of 1865, having reference to the question of the advisability
or otherwise of raising Barrack Buildings on vaulted basements

VIEWS OF LOCAL GOVERNMENTS AND OTHER AUTHORITIES UPON THE GENERAL QUESTION OF THE ADVISABILITY OR OTHERWISE OF RAISING BARRACK BUILDINGS ON VAULTED BASEMENTS	INSTANCES OF DAMPNESS DETECTED IN BARRACK FLOORS	TO WHAT CAUSES ATTRIBUTABLE	HEIGHT OF FLOORS FROM GROUND LEVEL	REMARKS
<i>His Excellency the Commander-in-Chief</i> is of opinion that as Government have decided on adopting a principle of construction involving double-stories, no necessity exists for the arched "basements"	...			The opinion of the Inspector General of Hospitals, Her Majesty's British Forces, is quoted by His Excellency in corroboration of his view
<i>The Government of Madras</i> are of opinion that the adoption of vaulted basements in that Presidency is not necessary, as the reports received from the Local Authorities show <i>satisfactorily</i> that a moderate elevation of flooring is amply sufficient to ensure dryness	Infantry Barracks, Madras Depôt ditto, Poonamallee Infantry ditto, Trichinopoly No 5, block of barracks and the solitary cells Foot Artillery Barracks, Bangalore. Ditto ditto, Cannanore Infantry Barracks, ditto	{ Either the spilling of water upon the floors, or the extreme humidity of the climate Faulty construction of flooring { Either the spilling of water upon the floors, or the humidity of the climate	..	{ The Superintending Engineer, 5th Division, states that in all cases where the basement is sufficiently raised, the damp will be found due to washing of floors, and not to soil or weather
<i>The Bombay Government</i> state that raised floors would be of great advantage in low countries, and that if the expense is not to be considered, it would be well to apply them to all Stations, doing so in the first place to low countries.	Artillery Barracks, Baroda Two Infantry, and one Artillery Barrack, Deesa and Ahoo Infantry Pindalls, Dharwar Old place-of-arms, ditto	Unknown	2 feet	Re examined subsequently, and dampness found to exist in one of the barracks only. Earth taken from ground level, found somewhat damp only At a depth below 3 feet At a depth of 2½ feet
<i>The Local Authorities</i> of the North Western Provinces, including the Local Government, appear to be entirely averse to the introduction of vaulted basements. The Local Government on its own parts adds that, unless care be taken to prevent noxious matter collecting in vaults under buildings, had consequences must arise from them, and that unless they be tolerably lofty, there would be great risk of their not being kept perfectly clean. The Officiating Superintending Engineer, 2nd Circle, gives it as his opinion that if barracks are raised to a height of 2½ to 3 feet above ground, vaulted basements are unnecessary	Barracks, Pandeypoor and Secrole * Infantry Barracks, Bareilly Infantry, Cavalry and Artillery Barracks, Meerut Roorkee Barracks, Sappers * Cawnpore single-storied barracks Jhansi Artillery Barracks, as well as Infantry Agra Barrack verandahs (Infantry, Lines)	Weather and soil Spilling of water upon the floors, or some other accidental cause. ... Faulty construction of flooring Moisture in the wall season, combined with the washing of floors Probably to the rains	18 inches or 1 foot on an average 3 to 4 feet From 9 to 18 inches on an average 2 feet 6 inches 3 feet on an average 12 inches on an average	Sub soil only found damp, but not the floors themselves, the floors of 2 barracks at each of the Stations were only opened out * One or two only found damp, and after rains No complaints of dampness were ever made by the occupants, ground below floor found damp only, the general conclusion arrived at in regard to Meerut was, that no dampness sufficient to cause sickness was anywhere Soil in damp Floors damp during rainy season Damp during rains

Abstract of replies received from Local Governments and Administrations, &c.—contd.

VIEWS OF LOCAL GOVERNMENTS AND OTHER AUTHORITIES UPON THE GENERAL QUESTION OF THE ADVISABILITY OR OTHERWISE OF RAISING BARRACK BUILDINGS ON VAULTED BASEMENTS	INSTANCES OF DAMPNESS DETECTED IN BARRACK FLOORS	TO WHAT CAUSES ATTRIBUTABLE	HEIGHT OF FLOORS FROM GROUND LEVEL	REMARKS
The opinion of the Punjab Government is that, firstly, raised hollow basements are not required, secondly, that floors should never be less than from 2 to 3 feet from the ground, and thirdly, that the space below floors should be solid and filled up with sand or gravel. The Local Authorities are unanimous in opinion that vaulted basements are unnecessary.	Inner verandah of one Artillery Barrack, Peshawur	To its proximity to the Soldiers' garden.	2 feet	Ground below a depth of 2 feet rather damp
	Two Barracks, Nowshera and Dera Ishmael Khan	To a wash-house being in the barrack	6 inches	Examined to a depth of 4 feet
	Phillour Barracks	To insufficient height of floors?	From 9 inches to 7 feet	Damp after rains
	Lahore Fort Barracks (old)	To heavy rains	1 foot	Damp in the middle of the rains only
The Chief Commissioner, Central Provinces, states that as all barracks are in future to be built of more than one-storey, the question raised by the Commission is set at rest, but that were it not so, he would certainly recommend that all single-storied buildings in the Central Provinces should be built on raised basements, having the air circulating under the floors.	Govindghur Cantonment Barracks (old)	To rains		
	Asseergurh Barracks	To the driving mists around the Hill		Slightly damp during rainy season only, and not productive of any inconvenience
The Chief Commissioner of Oudh is of opinion that vaulted basements are quite unnecessary in Oudh, where the barrack floors are well raised.			2½ to 3 feet	The barrack floors in Oudh are reported to be perfectly dry even in the height of the rains
The Governor of the Straits Settlements strongly advocates the construction of new barracks in the Straits upon vaulted basements, sufficiently high to admit of an arcade being formed below the flooring, in which the men could obtain exercise at all seasons and hours, being duly sheltered both from sun and rain.	Singapore Native Infantry Barrack	To the general moisture at certain times in the atmosphere, rather than to any actual defect in floorings	3 feet	Floors damp during rainy season
	Port Canning Artillery Barracks			Floors damp after rain
The Inspector General of Hospitals, Hyderabad Subsidiary Force, recommends, as a matter of sanitary economy, that barracks be built of two-stories, the upper to be the dwelling-place, and the lower to be used for Regimental buildings, &c., &c. The Resident observes that, as it has been determined by Government that all the new barracks to be built in future at Trimulgherry shall be double-storied, except the few required to complete accommodation for the 2nd European Regiment, and that as none of the floors of the existing buildings get				No complaints have ever previously been made of these barracks
				None of the barrack floors at Stations in Hyderabad have been reported to be damp

Abstract of replies received from Local Governments and Administrations, &c.—contd.

VIEWS OF LOCAL GOVERNMENTS AND OTHER AUTHORITIES UPON THE GENERAL QUESTION OF THE ADVISABILITY OR OTHERWISE OF RAISING BARRACK BUILDINGS ON VAULTED BASEMENTS	INSTANCES OF DAMPNESS DETECTED IN BARRACK FLOORS	TO WHAT CAUSES ATTRIBUTABLE	HEIGHT OF FLOORS FROM GROUND LEVEL	REMARKS
damp during the rains, the question raised by the Commission, as far as Hyderabad is concerned, is set at rest. The whole of the Authorities in Hyderabad, both Military and Medical, are unanimously of opinion that barracks should be built in double-storeys.				
The Agent, Governor General, Central India, concurs with the Superintending Engineer, Rajpootana Circle, in opinion that vaulted basements are quite unnecessary in Upper India, the Punjab, Central India and Rajpootana, and that a plinth of 3 feet above the level of the ground filled in, is all that is required to ensure the floor being perfectly free from damp, either from the weather of the soil.	Indore Barracks	To washing of floors	2½ feet	The floors become damp during the rainy season
The Agent, Governor General, Rajpootana, concurs with the Superintending Engineer, Rajpootana Circle, in considering it wholly unnecessary to raise barrack floors on vaulted basements, and recommends that floors be raised 3 feet above the ground, and made of stone laid in mortar, and that plinths should invariably be filled in with rammed kunkur, moorum, or gravel.	Neemuch temporary Barracks	To the weather, soil, and washing of floors	About 16 inches on an average	The Superintending Engineer strongly urges the construction of sub soil drains round buildings, at about 20 feet distant, under surface only, found slightly damp
The Bengal Government apparently prefers floors raised on arched flues 3 feet from the ground, to solid ones. The Officer, Superintending Engineer, Presidency Circle, estimates the cost of one of these floors, exclusive of foundations, to be about 5 annas per foot more than a solid one of the same kind, but the Local Government considers that the advantages of flued floors in Bengal quite justify this additional outlay in the principal barrack buildings. The Garrison Engineer is of opinion that raised floors on arched basements are drier than solid basements, especially if a layer of asphalt be laid in the walls and piers. The Superintending Engineers of the Barrackpoor and Dinapore Circles recommend vaulted basements,	Port William—Dalhousie Barracks	Not stated	On ground level 2 feet 3 inches thick	Brick work under flags only damp
	North Barracks	Ditto	A few inches only	Not occupied as sleeping rooms
	South "	Ditto	1 foot	
	Regimental Hospital	Ditto	2 feet	Has a low basement, and is not intended for occupation during rains
	Barrackpoor, Temporary Barracks.	Ditto	2 feet 6 inches	
	Dum-Dum, Barrack and Hospital	Ditto	3 inches on east, and 8 inches on west side	Under stones, mortar included
	Chingurah, Barrack	Ditto	6 inches on north, and 1 foot on south side	Below kunkur, &c
	Dinapore, Artillery Barrack	Ditto		
The Bengal Government apparently prefers floors raised on arched flues 3 feet from the ground, to solid ones. The Officer, Superintending Engineer, Presidency Circle, estimates the cost of one of these floors, exclusive of foundations, to be about 5 annas per foot more than a solid one of the same kind, but the Local Government considers that the advantages of flued floors in Bengal quite justify this additional outlay in the principal barrack buildings. The Garrison Engineer is of opinion that raised floors on arched basements are drier than solid basements, especially if a layer of asphalt be laid in the walls and piers. The Superintending Engineers of the Barrackpoor and Dinapore Circles recommend vaulted basements,	East Infantry Barrack	Ditto		

Abstract of replies received from Local Governments and Administrations, &c.,—contd.

VIEWS OF LOCAL GOVERNMENTS AND OTHER AUTHORITIES UPON THE GENERAL QUESTION OF THE ADVISABILITY OR OTHERWISE OF RAISING BARRACK BUILDINGS ON VAULTED BASEMENTS	INSTANCES OF DAMPNES DETECTED IN BARRACK FLOORS	TO WHAT CAUSES ATTRIBUTABLE	HEIGHT OF FLOORS FROM GROUND LEVEL	REMARKS
and the Superintending Engineer, Berhampoor, either arched floors or floors supported on iron girders. For barracks in Assam, floors well raised above the surface of the ground, to admit of a free circulation of air beneath, are recommended. The Deputy Inspector General of Hospitals, Dinapoor, thinks that no change is required in the present barrack flooring, but suggests planked flooring for hospitals generally.	European General Hospital	Not stated	4 inches on north, and 1 foot on south side	Whole floor damp The general opinion is, that in Bengal floors are not dry unless raised 3 feet from the ground on arched flues

(7)

No. 29, dated 16th September, 1868
From—The Secretary of State for India,
To—The Government of India.

With reference to the Despatch of your Excellency in Council, dated 13th March, No 41 of 1868 (Public Works Department), on the subject of barrack construction in India, I forward herewith, for your consideration, copy of a Memorandum received from the Army Sanitary Commission, which will be found to be substantially in accordance with the views expressed by your Excellency in Council.

Memorandum by the Army Sanitary Commission, on India Public Works Despatch No 41, dated 13th March 1868—Barrack construction in India

At page 19 of our suggestions for improving the sanitary condition of Indian Stations, the principle is laid down that barracks should be raised on arched basements. The object of this precaution is two-fold —1st, to raise the building generally above the influence of ground damp, whether in sub-soil or air, 2nd, to add to the height of the blocks in order that the men's sleeping rooms should be as much raised above the ground as possible, so as to diminish any risk of malaria.

The principle like all others is a general one which requires to be adopted to local peculiarities. This is the view which the Indian Government has taken of it, and in this the Commission concur.

They would again point out that in all low, flat and water-logged sub-soil localities in India, it would be absolutely necessary to introduce raised basements, while on well-drained or naturally dry sub-soils where there are sleeping rooms only on upper-floors of barracks, a raised basement might be dispensed with. The principle can only be applied or left unapplied in any district after careful local enquiry, and it might be well that in all reports on sites for new barracks the character of the sub-soil and amount of moisture in it, that is the depth from the surface at which water stands in a well or trial shaft during the wet season, should be stated, in order that the principle of basement elevation may be applied if seen to be necessary.

J HOPE GRANT,
Quarter Master General.
DOUGLAS GALTON
JOHN SUTHERLAND.
H H MASSY.
B H MARTINDALE
PROBY T CAUTLEY.
J R MARTIN
ROBERT RAWLINSON.
COLONEL MURRAY, (on leave).

WAR OFFICE,
8th August, 1868

J J. FREDERICK,
Secretary.

No. 150, dated 22nd October, 1868

Endorsed by Home Dept

Transferred with the enclosure to the Public Works Department

98

CIRCULAR No 94 PUBLIC WORKS.
GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
MILITARY WORKS

To

*The Secretary to Government of Madras.
Public Works Department.*

SIMLA, NOVEMBER 2, 1868.

SIR,

With reference to Public Works Department Circular No. 57, dated 22nd June 1865, on the subject of the advisability or otherwise of raising barrack buildings on vaulted basements, I am directed to forward, for information and guidance, copies of the correspondence with the Secretary of State on the subject as noted on the margin, and to request that the recommendations of the Army Sanitary Commission, as contained in the last para. of their Memorandum in regard to the character of the sub-soil and the amount of moisture in it, may invariably be complied with, when plans for barracks and hospitals and other important buildings intended as habitations, are submitted for the orders of the Government of India.

I have the honour to be,

SIR,

Your most obedient Servant,

(Signed) C. H. DICKENS, Colonel, R A.,
Secy. to the Govt. of India.

W. H. C. E.
Offg. Asstt Secy. to the Govt. of India.

R. M. 4520/68

35/1000 6/10

1878 Sept
No 4520

GOVERNMENT OF INDIA
PUBLIC WORKS DEPARTMENT.
MILITARY WORKS

CIRCULAR No. 94 PUBLIC WORKS.

Recd. Simla, November 2, 1868
received 21

Encl.

No 53-8 Jan 1869

Forwards, for information and guidance, copies of correspondence with the Secretary of State, and requests that the recommendations of the Army Sanitary Commission, in regard to the character of the sub-soil and the amount of moisture in it, may invariably be complied with when plans for barracks and hospitals and other important buildings intended as habitations, are submitted for the orders of the Government of India

With an order

Cue 4620

Govt. of 1868: Madras.

PUBLIC WORKS.

The Military Department

Sc, Ac, &c

Dated

1. 11

G O 8 Jan 1869 No. 53.

No. 115-116

Barracks and Hospitals Enclosed from the Govt of India requesting that, in future, certain information may invariably be furnished when submitting plans for barracks & hospitals and other important buildings intended as habitations. Cons. The Dept & the Commr

1878 Sept
15-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-1878
192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289-2290-2291-2292-2293-2294-2295-2296-2297-2298-2299-2300-2301-2302-2303-2304-2305-2306-2307-2308-2309-2310-2311-2312-2313-2314-2315-2316-2317-2318-2319-2320-2321-2322-2323-2324-2325-2326-2327-2328-2329-2330-2331-2332-2333-2334-2335-2336-2337-2338-2339-2340-2341-2342-2343-2344-2345-2346-2347-2348-2349-2350-2351-2352-2353-2354-2355-2356-2357-2358-2359-2360-2361-2362-2363-2364-2365-2366-2367-2368-2369-2370-2371-2372-2373-2374-2375-2376-2377-2378-2379-2380-2381-2382-2383-2384-2385-2386-2387-2388-2389-2390-2391-2392-2393-2394-2395-2396-2397-2398-2399-2400-2401-2402-2403-2404-2405-2406-2407-2408-2409-2410-2411-2412-2413-2414-2415-2416-2417-2418-2419-2420-2421-2422-2423-2424-2425-2426-2427-2428-2429-2430-2431-2432-2433-2434-2435-2436-2437-2438-2439-2440-2441-2442-2443-2444-2445-2446-2447-2448-2449-2450-2451-2452-2453-2454-2455-2456-2457-2458-2459-2460-2461-2462-2463-2464-2465-2466-2467-2468-2469-2470-2471-2472-2473-2474-2475-2476-2477-2478-2479-2480-2481-2482-2483-2484-2485-2486-2487-2488-2489-2490-2491-2492-2493-2494-2495-2496-2497-2498-2499-2500-2501-2502-2503-2504-2505-2506-2507-2508-2509-2510-2511-2512-2513-2514-2515-2516-2517-2518-2519-2520-2521-2522-2523-2524-2525-2526-2527-2528-2529-2530-2531-2532-2533-2534-2535-2536-2537-2538-2539-2540-2541-2542-2543-2544-2545-2546-2547-2548-2549-2550-2551-2552-2553-2554-2555-2556-2557-2558-2559-2560-2561-2562-2563-2564-2565-2566-2567-2568-2569-2570-2571-2572-2573-2574-2575-2576-2577-2578-2579-2580-2581-2582-2583-2584-2585-2586-2587-2588-2589-2590-2591-2592-2593-2594-2595-2596-2597-2598-2599-2600-2601-2602-2603-2604-2605-2606-2607-2608-2609-2610-2611-2612-2613-2614-2615-2616-2617-2618-2619-2620-2621-2622-2623-2624-2625-2626-2627-2628-2629-2630-2631-2632-2633-2634-2635-2636-2637-2638-2