DELHI DEVELOPMENT AUTHORITY

QUALITY CONTROL CELL

TECHNICAL CIRCULARS

COMPLIED BY :- **EXECUTIVE ENGINEER**
Q.C. V , DDA

OFFICE OF THE CHIEF ENGINEER.
QUALITY CONTROL CELL
VIKAS KUTBER:DDA:NEW DELHI

No.CE(3)/QC/Cir.File/353 Dt: 25/7/87

GENERAL CIRCULAR

It has been observed that replies from the EEs to various observation memos issued by this Cell do not follow a uniform pattern. While in some cases the EEs send the replies to their Superintending Engineers, with a copy endorsed to the Quality Control Cell, in other cases the reply is being addressed to the EE(Quality Control) with a copy to SE, ACE etc.

In future it may be ensured that the reply to the observation memo is submitted in accordance with the procedure laid down for the CTE under para 19(read with para 23) of Section 57, Chapter VI, CPWD Manual Vol.II. The field EE shall therefore submit his reply direct to this office without routing it through his SE and CE/ACE. Action at SE's level shall be taken as prescribed under above paras of the CPWD Manual.

All concerned may kindly note for strict compliance in future.

25/7

(Er.J.L.PINTO)
CHIEF ENGINEER(QC).

Copy forwarded to:-

1. CE, All ACEs and CPEs, DDA.
2. All SEs and SSWs, DDA.
3. All EEs and SWs.
4. EEs (Quality Control)

25/7

(Er.J.L.PINTO)
CHIEF ENGINEER(QC).

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
VIKAS KUTEER NEW DELHI

.....

No.CE(3)QC/82/CircularFile/ 52 Dated: 26.8.82

C I R C U L A R - 1

Subject: Improvement of quality - cement lime mortar.

It is seen that generally carbide lime of class C is being used for preparing cement lime mortar. According to the C.P.W.D. specifications Class 'C' lime cannot be used for mortar unless it is mixed with burnt clay pozzolona.in a ball tube mill to a specified fineness. This is not being done at site.

Moreover even if class 'A' or Class 'B' lime is used, the mixture of lime putty & sand is to be ground in a mortar mill before it is mixed with the cement but this is not being done at site.

In addition to giving an undue benefit to contractors, these deviations result in weak mortar which can also be risky in heavily stressed walls.

Instructions may therefore kindly be issued that the specifications are followed strictly in existing contracts. In future contracts, particularly on the ground and first floors where the walls are heavily stressed, we may consider the elimination of lime and the use of cement mortar only.

26/8

(J.L.PINTO)
CHIEF ENGINEER (QC)

Copy to:

1. Shri R.A.Khemani, Chief Engineer, DDA, New Delhi.
2. Shri V.V.Thakar, Addl.Chief Engineer, DDA, New Delhi.
3. Shri K.B.Razoria, A.C.E.-III, DDA, New Delhi.
4. Shri Trilok Singh, C.P.E.Rohini, DDA, New Delhi.
5. Shri H.D.Sharma, C.P.E.(Commercial), DDA, New Delhi.
6. All S.E.'s in the DDA for compliance.
7. All E.E.s in the DDA for compliance.

26/8

(J.L.PINTO)
CHIEF ENGINEER (QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
D.D.A., VIKAS KUTEER
NEW DELHI

No.CE/(3)/QC/82/Circular file/53 Dt.7.9.82.

C I R C U L A R - 2

Subject: General instructions - Quality Control.

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During inspection of some works it was very alarming to observe that poor & weak concrete with a low cement content occurs very frequently even in important items like R.C.C. slabs, beams & columns.

Para 5.11 of the C.P.W.D. Manual Vol.II specifically lays down that the Asstt.Engineer must make adequate surprise checks to ensure the quality of work during concreting. Thus the Asstt.Engineer as well as the Junior Engineer is personally responsible for the quality of the concrete.

Great care should be taken to ensure that the materials are mixed in the specified proportions & that larger quantities of fine & coarse aggregate are not added by the contractor.

In future cores of concrete will be cut at random & tested by the Quality Control staff. The Asstt.Engineer & Junior Engineer are personally responsible for the quality and strength of the concrete and the Ex.Engineer should also ensure that the quality of concrete in general is maintained.

7/9

(J.L.PINTO)
CHIEF ENGINEER (QC)

Copy to:

1. The Chief Engineer, DDA.
2. All A.C.E.s, DDA.
3. All S.E.s , DDA.
4. All Executive Engineers with 4 spare copies for Asstt.Engineers.

7/9

(J.L.PINTO)
C.E.(QC)

DELHI DEVELOPMENT AUTHORITY
Quality Control Cell

No. CE(3)QC/82/Ciruelar File/98 Date: 18.9.82.

C I R C U L A R - 3

Sub: MEASURES TO IMPROVE THE QUALITY OF WORK
- RAIN WATER DRAINAGE

The Residents Association of some flats constructed by DDA have complained to the L.G. about improper roof drainage resulting in flooding of their flats during heavy rains.

On inspection it was observed that a downtake pipe was provided from the roof to the small terrace belonging to the 2nd floor occupant. Similarly the rain water accumulated on the 2nd floor terrace was made to discharge on to the 1st floor terrace belonging to the first floor occupant. From this terrace the water was led into a garage on the ground floor belonging to some other occupant. To make matters worse floor traps were provided at the inlets of the rain water pipe and the diameter of the rain water pipe was kept very small -50mm dia. The result is that each terrace and the garage at ground floor got flooded during heavy rains and water flows into the adjacent flats.

This faulty planning of rain water drainage may be avoided in future. Rain water should not be allowed to discharge on to terraces or garages at a lower level. Also floor traps may not be provided at inlets to rain water pipes.

17/9

Chief Engineer(QC)
Delhi Development Authority

Copy to:

1) PS to EM
2) Chief Architect DDA
3) CE DDA
4) All ACEs DDA
5) All Senior Architects DDA
6) All SEs DDA

17/9

Chief Engineer(QC)
Delhi Development Authority

DELHI DEVELOPMENT AUTHORITY
Quality Control Cell

No.CE(3)/QC/82/Ciruelar File/99 Date: 18.9.82.

C I R C U L A R - 4

Sub: MEASURES TO IMPROVE THE QUALITY OF WORK
- RAILING FOR STAIRCASES, BALCONIES, TERRACES

The occupants of some flats constructed by the DDA have complained to the L.G. about the flimsy staircase railing in their flats which was found to be shaking and vibrating when given a push. The railing was supported on 10mm X 10mm square bars spaced at about 300 mm c/c.

It is necessary to avoid such flimsy railings on staircases, balconies and terraces. According to the IS code such railings in residential buildings should be designed for a horizontal force of 25 lbs/ft. or 37kg/m applied at handrail level.

It is also necessary to ensure that the gaps in the grill work are not so large as to allow a small child to fall through.

17/9

Chief Engineer(QC)
Delhi Development Authority

Copy to:

1. PS to EM
2. Chief Architect DDA
3. All Senior Architects DDA
4. CE DDA
5. All ACEs/CPEs DDA
6. All SSWs/ DDA
7. All SEs DDA

17/9

Chief Engineer(QC)
Delhi Development Authority

DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL
.....

No.CE(3)/QC/82/Circular/100 Dated:18/9/82.

Subject:Quality Control Circulars. - 5

It is very alarming to note that the mortar in joints of walls of four storeyed structure is very often found to be very weak. These walls are structural members & highly stressed.

At times a richer mortar of cement mortar 1:4:6r cement lime mortar 1:1:6 is specified in such walls by the S.S.W. It was distressing to observe that in some cases the supervisory staff were not even aware of the richer mix specified by the S.S.W.

It is impossible to replace the weak mortar or even to accept the work at reduced rates because it is structurally unsound. The entire work then becomes infructuous.

The supervisory staff should therefore ensure that at least in structural walls the correct mix of mortar is used and that it is properly cured.

18/9
(J.L.Pinto)
Chief Engineer (QC)

Copy to:

1. P.S. to E.M. for information.
2. All C.E's/A.C.E's, DDA.
3. All S.E.s, DDA.
4. All Executive Engineers, DDA.
5. All Asstt.Engineer, DDA.

18/9
(J.L.Pinto)
C.E.(QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS SUTEER NEW DELHI

No. CE(3)/QC/82/Circular/30 Dated: 29.9.82.

From

J.L.Pinto,
Chief Engineer(QC).

To

Shri R.A.Khemani,
Chief Engineer,
Delhi Development Authority
New Delhi.

Sub: Use of lime in buildings.

In all the contract forms of the DDA the following clause is provided:-

"Only lime of class A as per I.S.712: 1973 shall be used straight i.e. without the addition of surkhi or some pozzolonic material. Lime of class B & C can be used with the addition of surkhi or other pozzolonic material. Surkhi produced by the N.B.C.C. mechanised brick plant is approved for use. Surkhi from any other source will be accepted if found satisfactory after detailed tests."

From enquiries made in the market & the Shri Ram Test House it is learnt that class A lime is not available in Delhi and there is only one known supplier of Class B lime from Katni which may not be available in sufficient quantities.

As per the C.P.W.D. specifications only on LP-40 type lime pozzolona mixture shall be used which is obtained by intergrinding burnt clay pozzolone and dry hydrated lime in a ball tube mill to a fineness of an I.S. 15 mesh sieve. It is not known whether this equipment is available.

Surkhi produced by the N.B.C.C. mechanised brick plant is known as Reactive Surkhi. The N.B.C.C. plant has since closed down and it is learnt that such Reactive Surkhi is not available in Delhi.

Thus in all the contracts the specifications laid down in the Agreement are not being followed. In practice most of the contractors use carbide lime conforming to class C in the form of lime putty & without the addition of Reactive surkhi. Also the lime putty sand mixture is not being ground as required by the specifications. Hence a reduction in rate is called for for not adding Reactive Surkhi and for not grinding the lime sand mixture. It is requested that this may please be examined & instructions issued to the field staff to prepare the above Reduced Rate statement.

contd.....

In one of the works it was observed that a lime -surkhi -sand mortar using Hydrated lime was found to give a better strength than a plain lime sand mortar. After fuetner experimentation it may be explored whether the above Agreement Clause can be modified to provide for cement - lime-surkhi-sand mortar with only Hydrated lime class C or 1 lime: 1 surkhi: 1 sand or 1 lime : 2 surkhi mortars using only Hydrated lime class C. Until the above experiments are completed we may perhaps specify only cement mortar in future contract documents.

(J.L.Pinto)
Chief Engineer (NZ)

Copy to:

1. P.S. to E.M.
2. All A.C.E.s, DDA.
3. All C.E.s., DDA.
4. All S.E.s, DDA.

(J.L.Pinto)
C.E.(NZ)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS KUTIR NEW DELHI

CE(3)/QC/82/CIRCULAR FILE/193 15.X.82

Subject: Quality Control Circulars. 7

A list of defects commonly observed in the various buildings inspected is enclosed herewith. It is requested that this list may be circulated among all Assistant Engineers & Junior Engineers so that special attention may be paid to these points and these commonly occuring defects avoided in future.

(J.L.PINTO)
CHIEF ENGINEER (QC)

Encl:As above

Copy to:

1. P.S. to E.M.,DDA for information.
2. Shri V.R.Vaish, Chairman Quality Control,DDA,for information,
3. Sh.R.A.Khemani,C.E.,DDA
4. All Additional Chief Engineers/C.P.E.s,DDA.
5. All S.E.s/S.S.W.s,DDA.
6. All Executive Engineers & S.W.s.,DDA.
7. All Asstt.Engineers, DDA.

(J.L.Pinto)
C.E.(QC)

List of defects commonly observed:

I. CONCRETE WORK:

1. Coarse aggregate:

(i) Oversize aggregate is used without proper grading.
(ii) Katcha pieces in aggregate exceeds 5%.
(iii) Sieve analysis not done.
(iv) Under floor lean concrete has very low cement content.

2. Sand:

(i) Silt content not being tested -poor quality with 18 - 35% silt.
(ii) Sieve analysis not done.
(iii) Sand being used without screening.

3. Strength of concrete:

(i) Poor strength - less cement used - poor shuttering with gaps - less curing.

4. Dimensions:

(i) Width & thickness less than measurements in M.B. and less than thickness required for structural safety.

5. Honey combing & loose aggregate due to less cement used.

6. Curing not being done properly - dates not marked.

7. Handmixed instead of meachine mixed.

II. R.C.C. WORK:

1. Coarse aggregate:

(i) Oversize aggregate used.
(ii) Katcha pieces exceeds 5%.
(iii) Sieve analysis not done.
(iv) 12mm & down gauge not used resulting in honey combing and poor strength.

2. Sand:

Same as 2 above.

3. All Test Registers such as cube, bricks, sand etc. are fictitious.
4. Concrete not mechanically vibrated.
5. Surface not hacked.
6. Weak concrete with less cement.
7. Ingredients not measured properly.
8. Thick slurry not provided and loose grit not cleaned at construction joints.
9. No chairs in chajjas and cantilevers - reinforcement provided at bottom instead of at top.
10. Thickness and dimensions less than those required for structural safety.

contd.....

11. Supports not provided at all edges of two-way slab.

12. Beams made to span over larger openings by avoiding intermediate supports.

13. Reinforcement not properly spaced.
14. Binding wire used of smaller gauge.
15. No cover blocks provided and reinforcement exposed.
16. Columns eccentrically placed and out of plumb.
17. Lines and levels not maintained.
18. Ballies inclined and not wedges provided.
19. Excessive plastering to make up the dimensions.
20. Supports of R.C.C. shelves not anchored properly into wall.
21. Standard measuring boxes are not used.
22. Proper and adequate bearings are not given.

III. BRICK WORK:

1. Mortar:

(i) Generally very weak with less cement content.
(ii) Structural drawings not being followed leaner mortar being used when richer mortar is specified.

2. Grading of fine sand not being followed- Badar pur sand not being added.
3. Mixing of mortar done by hand instead of by machine.
4. Curing inadequate - dates not written on cement work.
5. Inadequate soaking of bricks.
6. Inadequate raking of joints.
7. Cross walls not bonded to long walls.
8. Walls out of plumb and deviating from a straight line.
9. Thickness of joints exceeds 1 cm.
10. Work not done to lines and levels.
11. Joints are hollow- mainly vertical joints.
12. Scaffolding provided on inside instead of outside.
13. Expansion joints not provided at 24m intervals.
14. Class C lime being used without addition of surkhi and grinding of mortar.

IV. WOODWORK:

1. Mandatory number of tests on flush doors not being done.

V. STEELWORK:

1. Priming coat not applied.
2. Paint Register for primer not maintained.
3. Primer not of approved quality & empties not kept
4. at site.

4. Large gaps between masonry and door and windows frames.

contd.....

5. Steel window sections not of approved make and of less sectional weight.

6. Projected hinges not provided for windows.
7. Fabrication of windows is not true and these are not welded properly.

8. Hinges to be welded to frame at 5 points but generally not done.

VI. FLOORING:

1. Underlayer of marble mosaic flooring very weak with low cement content.
2. Less thickness of glass strips.
3. Finishing as well as slopes are not proper, particularly in kitchen, bathrooms, balconies etc..

VII. ROOFING:

1. No bhoosa or gobri plaster over mud phuska.
2. Slopes inadequate and much less than 1 in 50.
3. Gola made of mortar instead of concrete.
4. First class bricks not tested.
5. Grouting is weak.
6. Local depressions.

VIII. FINISHING:

1. Badarpur not being added to jamuna sand.
2. Plaster is weak due to low cement content & lack of curing.
3. Mortar mixed by hand instead of by machine.
4. Lines and levels not maintained.
5. Glazed tiles not tested.
6. Paint of approved quality not used.
7. Paint Register not maintained & empties not kept for inspection by the Ex.Engineer.
8.

IX. WATER SUPPLY & SANITARY INSTALLATIONS:

1. Lead totally inadequate in joints of C.I. pipes.
2. Lead Register not being maintained.
3. Poor & weak concrete with inadequate reinforcement in water storage tanks.
4. Weak concrete and of lesser dimentions around stoneware & R.C.C. pipes in some of cases no concrete all roung but paid for.
5. Hume pipes do not conform to I.S. specifications vis. of less thickness and totally inadequate reinforcement.
6. Joints in sewer lines not being tested.
7. Hemp yarn not soaked in bitumen and thick cement slurry.
8. External water supply lines not being tested to twice the working pressure for every 500m length. Also leakage test not being conducted.
9. Thickness of C.I. pipes less than specified.
10. No smoke test is conducted for soil pipes.

(J.L.Pinto)
Chief Engineer(QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS KUTEER NEW DELHI.

.....

No.CE(3)/QC/82/Circular file/206 dated: 19.10.82.

Subject: Quality Control Circulars. 1108

During my various inspections it is very alarming to observe that the reinforcement in cantilevers, landings, chajjas etc. is very often depressed to the middle or bottom of the section instead of being placed at the top. This poses a great danger to the lives of labourers and occupants of the building particularly as these are prone to overcrowding for witnessing a wedding procession or during some celebrations. In fact, one such cantilever landing failed under the weight of labourers in my presence during inspection of a work.

Strict instructions may be issued that cantilever reinforcement should be held in position by stirrups or steel chairs, the dimensions and heights of which should be worked out by the Ex. Engineer himself. The lever arm should also be checked before concreting by measuring the height of the main reinforcement above the bottom of the shuttering.

19/x

(J.L.Pinto)
Chief Engineer(QC)

Copy to:

1. P.S. to E.M., DDA, for information.
2. Chief Engineer, DDA.
3. All A.C.E.s and C.P.E.s ,DDA.
4. All S.E.s, DDA.
5. All Executive Engineers, DDA.
6. All Asstt.Engineers, DDA.

19/x

(J.L.Pinto)
C.E.(QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA, VIKAS KUTEER NEW DELHI
.....

No.CE(3)/QC/82/Circulars/232/34 Dated: 22.10.82.

Sub: Quality Control Circulars - Road work.

In the case of Road work, it appears to be a general practice in the DDA to provide much less material than measured and paid for e.g. stone metal, chippings, bitumen etc. Moreover the stone metal is very much oversize.

Strict warnings may be issued to all contractors and staff to ensure the proper quantity and quality of materials. Random checks will be exercised by the Quality Control Wing. If any deviation in quantity or quality from the specifications is observed penal recoveries will be effected from the contractors and recommendations will be made to blacklist them and disciplinary action will be initiated against the defaulting supervisory staff.

(J.L.Pinto)
Chief Engineer (QC)

Copy to:

1. P. S. to V.C.

(J.L.Pinto)
CE(QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS KUTIR NEW DELHI.

No.CE(3)/QC/82/Circular/233 Dated: 22.10.82.

Subject: Quality Control Circulars - 10
- Slenderness ratio of walls

According to I.S.1905 - 1980, for a wall, the slenderness ratio shall be the effective height divided by the effective thickness or the effective length divided by the effective thickness, whichever is less.

When the room size is large, the slenderness ratio is governed by the effective height. In the case of ground floor walls the height H of the wall is reckoned from the centre of the first floor slab to the top of the footing and the effective height is 0.8 H. Due to the greater slenderness of ground floor walls, the permissible stresses are greatly reduced and it may be necessary to reinforce the 23 cm. thick wall or to provide a 34 cm. wall at such locations.

(J.L.Pinto)
Chief Engineer (QC)

Copy to:

1. C.E., DDA.
2. All A.C.E.s & C.P.Es., DDA.
3. All S.S.W.s, DDA.
4. All S.E.s, DDA.
5. All S.W.s, DDA.

(J.L.Pinto)
C.E.(QC)

OFFICE OF THE CHIRF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS KUTEER NEW DELHI.

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No.CE(3)/QC/82/Cir.file/235/35 Dated: 2.11.82.

Subject: Quality Control Circulars - 11
Flooring.

According to the C.P.W.D. specifications, 1977 the rate per square meter of cement concrete flooring includes the cost of cement slurry on the slab or subgrade and the cost of glass or A.C. strips also, Hence no separate provision is to be made in the tender document for cement slurry glass or A.C. strips and these are not to be paid for separately. Wherever separate payment has been made for these items, recoveries may be effected.

(J.L.Pinto)
Chief Engineer (QC)

Copy forwarded to:

1. P.S. to V.C. for information.
2. P.S. to E.M. for information.
3. C.E., DDA.
4. All A.C.E.s & C.P.E.s, DDA.
5. All S.S.W.s & S.E.s, DDA.
6. All Executive Engineers, S.W.s, DDA.

(J.L.Pinto)
C.E.(QC)

DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL
DDA VIKAS KUTEER
NEW DELHI.

No.CE(3)/QC/82/Circular file/22 Dated: 13.11.82.

From

J.L.Pinto,
Chief Engineer (QC).

To

Shri R.A.Khemani,
Chief Engineer,
Delhi Development Authority,
Vikas Annexe,
New Delhi.

Sub: Quality Control Circulars - 12
Electrical work.

In most of the works inspected by me it is seen that long and deep horizontal chases are being cut in heavily stressed load bearing walls for supporting shelves and embedding conduits for electrical wiring. Such chases endanger the structural stability of these buildings.

It is necessary to find a solution to this problem by embedding the conduits in the masonry or in the slab as the construction proceeds.

It is requested that necessary instructions may please be issued to all the Electrical Engineers to take advance action on this.

13/11

(J.L.Pinto)
Chief Engineer (QC)

Copy to:

1. Shri Vardharajan, S.E.(Electrical), DDA.
2. All E.E.S(Electrical), DDA.
3. All A.E.s, (Electl.), DDA.

13/11

(J.L.Pinto)
C.E.(QC.)

DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL

13

Sub: Quality control -design of cantilevers.
No.CE/3/QC/82/Cir.file/309 Dated:30.11.82.

Subject: Quality Control -design of cantilevers.

In many designs of the DDA it is seen that projecting or overhanging rooms or landings are supported on cantilever brackets embedded in supporting walls. It is seen that such brackets are not being tested for stability or stresses in the supporting masonry.

According to para 19.1.1 of IS 456 -1978 the anchorages or counter weights provided for overhanging members (during construction and service) should be such that static equilibrium shall remain even when the overturning moment is doubled. This check is invariably to be exercised and moments may be taken about the centre of the supporting column or pier. Safeguards to be taken during construction such as supporting the cantilevers and constructing the counter weight structure first before loading the projected portion are to be specifically mentioned in the structural drawings.

Para 4.42 of IS 1893 -1975 states that all horizontal projections like cornices & balconies shall be designed to resist a vertical force equal to five times the vertical seismic coefficient multiplied by the weight of the projection. This would mean that for Delhi the overturning moment will have to be increased by 12.5%.

Apart from the stability of the structure it is also to be ensured that the bearing stress in the masonry supporting the bracket does not exceed the limits specified in IS 1905-1980. This is done by calculating the point where the resultant vertical force intersects the surface of the masonry. Assuming a triangular stress block to give the same resultant and ignoring tension in the masonry the maximum compressive stress in the masonry can be calculated. The anchorage and counterweight of the bracket should be sufficiently long to keep the bearing stress within prescribed limits.

contd....

I.S 1905 under revision discourages high edge stresses in masonry because of its unfavourable dispersion characteristics and the formation of tension cracks in the top edge of the wall. Hence it is necessary to avoid overstressing the masonry by providing an R.C.C. column at the fulcurm of the brackets.

It is requested that all overhanging or contilevered portions of the structure may be checked on the above lines and revised structural drawings issued even in the case of works in progress so that adequate safety margins are provided in buildings yet to be taken up. In the case of buildings which have already come up suitable propping & strengthening measures have to be devised to give the desired safety margin as, in the absence of the above checks, the overhanging structures may be unsafe.

(J.L.Pinto)
Chief Engineer (QC)

Copy forwarded to:-

1. P.S. to the Chairman (QCC), DDA.
2. P.S. to E.M.
3. Shri R.A.Khemani, C.E., DDA.
4. Shri V.V.Thakar, Addl.Chief Engineer,DDA.
5. Shri K.B.Rajoria, Addl.Chief Engineer,DDA.
6. Shri Trilok Singh, C.P.E.(Rohini).
7. Shri H.D.Sharma, C.P.E., DDA.
8. S.S.W.I and S.S.W.II, DDA.
9. All S.Ws under S.S.W.I & S.S.W.II.
10. All S.E.s, DDA.

(J.L.Pinto)
C.E.(QC)

DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL
VIKAS KUTBER: NEW DELHI

NO. CE(3)/QC/32/Circular file/329 DATE: 7th Dec.82

Sub: Quality Control Circulars - 14
7cm brick masonry parapet walls.

In a number of houses it is seen that parapet walls of balconies, landings and staircases are constructed of 7cm thick brick masonry (brick on edge) in cement mortar 1:3. It was seen that when such a parapet wall is given a sharp push it collapses thus endangering the lives of occupants as well as passers-by below.

According to para 3.3 of IS 875 - 1964 such parapets are to be designed for a horizontal force of 75kg.f at handrail or coping level. The resulting stresses are 8.54 kg/cm2 compressive against a permissible compressive stress of 7.5 kg./cm2 and 8.54 kg/cm2 tensile against a permissible tensile stress of 0.7 kg/cm2 and such parapet walls are obviously unsafe.

If such walls are to be constructed it is necessary to reinforce them with horizontal R.C.C. bands at intervals and vertical R.C.C. bands at intervals anchored into the supporting slab.

(J.L.PINTO)
CHIEF ENGINEER(QC)

Copy to

1) CE DDA
2) All ACEs & CPEs DDA
3) All SSWs & SWs DDA
4) All SEs DDA

OFFICE OF THE CHIEF ENGINEER (Q.C.)
DELHI DEVELOPMENT AUTHORITY

NO: CE(3)/QC/82/Circular file/330 Dated the 7th Dec.,82

Subject: Quality control circulars - Embedding steel in lime mortar. No 15

In a number of buildings it is observed that corner reinforcement for earthquake resistance and C.I.pipes and specials are embedded in lime mortar, cement lime mortar or lime concrete. In several buildings this has resulted in accelerated corrosion of the steel leading to corrosion expension and vertical cracks in the masonry wall. No remedial measures are possible as the steel cannot be removed from the masonry.

Wherever reinforcement is to be provided in masonry it should invariably be embedded in cement concrete 1:2:4 as even cement mortar does not offer adequate protection against corrosion and may not bond effectively with the reinforcement.

7/12

(J.D.Pinto)
Chief Engineer(Q.C.)
DELHI DEVELOPMENT AUTHORITY.

Copy to:-

1.Chief Engineer, DDA
2.All A.C.Es. & C.P.Es.,DDA.
3.All S.E.Ms & S.Ms.,DDA.
4.ALL S.Es.,DDA.
5.All E.Es,DDA.

OFFICE OF THE CHIEF ENGINEER (Q.C.)
DELHI DEVELOPMENT AUTHORITY

NO:CE/3/QC/32/Circular file~~/52/54~~ 363

8th Dec.,1982

No 16

Subject: Quality control circulars - dry brick pitching.

Para 21.6.2 of the C.P.W.D. specifications Vol.II for dry brick pitching of drains states that at the top and at every 3 m interval, brick courses of half brick width shall be laid with bricks on ends. Para 21.6.3 states that measurements of the dry brick pitching half brick deep for the drains shall be taken by adding a half brick length on either side to the perimeter of the drain so as to allow for the top full courses.

These specifications should be followed strictly in future. For work not done to the above specifications the perimeter length should be reduced correspondingly and the rate reduced for the lesser number of bricks used.

(J.L.Pinto)
Chief Engineer(QC)

Copy forwarded to:
1.Chief Engineer,DDA.
2.All A.C.Es. & C.P.Es.,DDA.
3.All Supdtg.Engineers,DDA
4.All Executive Engineers.
5.All Assistant Engineers,DDA.

OFFICE OF THE CHIEF ENGINEER (QC)
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No: CE(3)QC/82/Cir file/382. Dated the 9th Dec.,82

SUBJECT: Quality Control - Cement concrete gola

Circular No-17

According to para 12.17.2 of the C.P.W.D. specifications for cement concrete gola an expansion joint in the gola is to be provided at every 3.5 to 4.5 metre & filled with a bitumen filler prepared by mixing bitumen, cement & coarse sand in the ratio of 80 kg. of bitumen:

1 kg of cement : 0.25 cubic metre of sand.

It is seen that such expansion joints are not being provided in the cement concrete gola. In such cases the rate has to be reduced proportionately.

In future it may be ensured that expansion joints are provided as specified.

(J.L.Pinto)
Chief Engineer(QC)

Copy forwarded to:-

1. Chief Engineer, DDA for information.
2. All A.C.Es. & C.P.Es. DDA for information.
3. All S.Es.,DDA.
4. All Executive Engineers.
5. All Assistant Engineers, DDA.

(J.L.Pinto)
Chief Engineer(QC)

DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL
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No.CE(3)/QC/82/Cir.file/350 Dated: 11.12.82.

1&

Subject: Quality Control -Stresses in masonry walls.

On perusal of some design calculations it is seen that the stresses in pillars & small lengths of masonry between openings are not being checked. Similarly bearing stresses at the seedings of beams and lintels at critical locations are not being checked.

Very often heavy loads are concentrated at the isolated end of a masonry wall by providing openings on either side. Heavy loads at the end of an isolated wall cause tension on the top edge of the masonry wall or on the horizontal edges of any opening in the heavily stressed area of the wall. This causes vertical cracks in the wall & separation of the end of the wall from the main wall leading ultimately to failure of the end of the wall. Such loads also cause large shear stresses at the corner on a plane at 45° to the vertical. Also such eccentric loads have poor dispersion characteristics as they cause tension in the masonry. Therefore if such a situation is unavoidable an R.C.C. column may have to be provided.

Para 4.1 of I.S 1905 - 1980 states that load bearing walls are structurally most efficient when the load is uniformly distributed and when the structure is so planned that eccentricity of loading on the members is as small as possible.

Para 4.3 states that the thickness of a load bearing wall shall be sufficient at all points to ensure that stresses during the worst condition of loading for which the wall is designed are within safe limits.

Para 5.3 & 1.3 states that in a wall or column subjected to vertical & horizontal forces the two forces shall be combined by regarding the vertical force as acting at a statically equivalent effective eccentricity. It also gives the rules for estimation of stresses due to eccentric loading.

Para 5.3 .1.6 states as under:-

a) Masonry is capable of taking 50% greater stress if the load is of a concentrated nature. This increases and the avoidance of stress reduction due to slenderness in the top & bottom 1/8th height of the wall should not be applied simultaneously but the one which permits a higher stress should be applied.

When a concentrated vertical load is transmitted through masonry the angle of dispersion of the loading shall be taken as not more than 30° from the direction of such loading.

contd.....

The length of the wall element to be considered as effective in resisting a concentrated load shall not exceed the centre to centre distance between the loads nor shall it exceed the width of bearing plus four times the thickness of the masonry element.

Whenever there is a concentrated load on masonry it should be checked whether the bearing stress is within permissible limits or not. If it is not a concrete bed- block should be introduced below the load to bring down the stress in the masonry within safe limits. The increase in stress of 50% is not permitted for the cross-section of masonry below a bed block. The angle of dispersion within the bed block is 45°.

Para 5.3 states that lintels & other elements that support masonry shall be designed to carry the loads from the masonry (allowing for arching where applicable). The length of bearing of the lintels at each end shall not be less than 9 cm or one tenth of the span, whichever is more, the area of the bearing shall be sufficient to ensure that the stresses in the masonry (combination of wall stresses, stresses due to arch action & bearing stress from the lintel) do not exceed the permissible stresses.

Para 6.2.4 states that when narrow stretches of masonry (or short lengths of walls) such as between doors & windows cannot be avoided, they should not be pierced with openings for soil pipes, waste pipes, timber joists, switch boards etc. where there is a possibility of load concentration such small lengths of walls shall be checked for stresses & high strength bricks/mortar or concrete walls provided if required.

Wherever concrete walls are provided between two opening, bed blocks should be provided above & below such walls to disperse the concentrated loads and bring the bearing stresses in the masonry within safe limits.

The above excerpts from I.S. 1905-1980 underline the importance of checking the stresses in pillars, piers & small wall lengths between openings.

(J.L.Pinto)
Chief Engineer (QC)

Copy forwarded to:

1. C.E., DDA, for information.
2. All A.C.E.s & C.P.Es for information.
3. All S.S.W.s & S.Es for necessary action.
4. All S.Ws under S.S.Ws & S.Es for necessary action.

(J.L.Pinto)
Chief Engineer (QC)

Subject: DELHI DEVELOPMENT AUTHORITY
QUALITY CONTROL CELL

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No. CE/3/QC/32/Circular/407 Dated: 20.12.82.

Subject: Quality Control - R.C.C. work. - 19

In order to ascertain the malpractices extant in the DDA during concreting operation, a covert watch was kept incognito on some of these operations in the DDA.

It was very distressing to observe that no effort is being made by the supervisory staff to control the concrete mix. Coarse & fine aggregate are being dumped into the mixer from wicker baskets of diverse sizes & indeterminate cubical contents. Assuming that a wicker basket has a volume of ½ a bag of cement, the concrete actually being mixed and laid was found to vary from 1:4:4.5 to 1:5:5 depending on the whims of the mixer driver.

Chemical tests on concrete cores taken show mix proportions of 1:6:6.5 and 1:7:9 and 1:5.5:4.5 which roughly tally with the field observations made above. This is the main reason for the low cube strengths of 40-80 kg./cm2.

In order to improve the quality of at least R.C.C. work in the D.D.A., the C.Es/A.C.Es/C.P.Es are requested to issue the following instructions:-

1. The use of wicker baskets for measuring coarse and fine aggregate should be banned.
2. Cement, sand & aggregate should be measured with a level top in wooden boxes of specified internal dimensions.
3. The A.E. & J.E. should invariably be present during concreting operations and one of them should stand at the mixer for controlling the mix.
4. A low crushing strength and low cement content found in cores extracted and chemical testing by the Quality Control Wing will definitely result in disciplinary action against the A.E. & J.E. concerned and also of the E.E. concerned for failure to make proper arrangements for concreting.

(J.L.Pinto)
Chief Engineer (QC)

Copy forwarded to:-

1. P.S. to E.M. for information.
2. Chief Engineer, DDA.
3. All A.C.E.s/C.P.Es, DDA.
4. All S.E.s, DDA.
5. All E.E.s, DDA.
6. All A.E.s, DDA.

(J.L.Pinto)
C.E.(QC)

OFFICE OF THE CHIEF ENGINEER
QUALITY CONTROL CELL
DDA VIKAS KUTEER: NEW DELHI

Circular no - 20

NO. CE(3)/QC/82/Circular/459 Dated:3.1.1983

SUBJECT: MEASURES TO IMPROVE QUALITY. - 20

A task force has been set up by the V.C. to technically examine all housing projects of the DDA with special emphasis on structural items.

Guidelines for inspection of structural brick masonry and structural concrete are given below:-

(1) BRICK MASONRY:-

1. Whether joints filled with morter.
2. Strength of morter by prodding.
3. Thickness of joints should not exceed 1cm.
4. Long walls and cross-walls properly jointed and not by toothing.
5. Brick wall is vertical and not curved.
6. Whether peela bricks have been used.
7. Whether coarse sand available in morter.
8. Whether brickbats have been used.
9. Whether brick layers even and horizontal.
10. Whether corner reinforcement embedded in cement lime mortar.
11. Brick on edge and half brick parapet walls and balustrades are unsafe.
12. Whether chases have been cut for shelves,electrical conduits and water supply pipes.
13. Samples of mortar to be collected for chemical analysis.
14. Whether expansion joints provided at 30m intervals.
15. Whether surkhi added to lime and lime mortar ground.
16. Whether correct mortar mix as per structural drawing has been used.

(2) R.C.C. WORK:-

1. Strength of concrete by hammering.
2. Weak concrete samples to be taken for chemical analysis.
3. Whether graded aggregate has been used.
4. Whether aggregate contains kutcha material.
5. Whether water has been tested.
6. Whether adequate cover provided.
7. Whether reinforcement exposed.
8. Honey combing-extent and quality of repairs.
9. Whether reinforcement properly placed.
10. Whether reinforcement in cantilevers placed at top and not at bottom or middle.
11. Whether expansion joints provided at 30m intervals.
12. Dimensions of beams and slabs compared with structural drawings-particularly waist slabs.
13. Whether cracks noticed in slabs or beams.

Contd...2...,

14. Whethe adequate anchorage and counter-weights provided for cantilevers.

15. Whether shelves are properly supported on brackets passing through the wal' or on dwarf walls.

16. Whether thick slurry provided and loose grit cleared at construction joints.

17. Whether two way slabs properly supported.

18. Whether beams and slabs made to span over large openings avoiding intermediate supports.

19. Whether columns are accentric, out of plumb and curved.

20. Whether lines and levels maintained.

21. Whether ballis are vertical or inclined and wedges provided.

22. Whether diametre of ballis is less than 100mm.

23. Whether excessive plaster done to maintain dimensions.

24. Whether bearings of lintels and beams not less than 9 cm or 1/10 span, whichever is more.

(J.L.Pinto)
Chief Engineer (QC)