NOTES :-

STRUCTURAL DRAWINGS SHOULD BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTURAL DRAWINGS.

THIS NOTE VALID FOR THE DRAWING RELATED TO THIS PROJECT:

1. PLEASE DO NOT SCALE FROM THE DRAWINGS.

2. ALL DIMENSIONS ON THIS DRAWINGS SHALL BE CHECKED ON SITE BEFORE WORK COMMENCES. FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALE DIMENSIONS.

3. PROJECT ENGINEER, SITE ENGINEER, CONTRACTORS & THE SUB CONTRACTORS ARE TO VERIFY THE FOLLOWINGS AT SITE:-
   a) REINFORCEMENT POSITION.
   b) DEVELOPMENT LENGTH.
   c) CLEAR COVER.
   d) CONCRETE MIX RATIO.
   e) ALL DIMENSIONS AND LEVEL.

4. PROJECT ENGINEER, SITE ENGINEER, CONTRACTORS & THE SUB CONTRACTORS IS TO NOTIFY THE CONSULTANT ABOUT ANY DISCREPANCIES / DIFFERENCES CONTAINED IN THE DRAWING (IN RELATION TO OTHER DRAWINGS) BEFORE BEGINNING THE WORK COMMENCES.

COPY RIGHT:-

DRAWINGS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE AND SHALL REMAIN THE PROPERTY OF ENGINEER / CONSULTANT / FIRM WHETHER THE PROJECT FOR WHICH THEY ARE MADE IS EXECUTED OR NOT. THEY ARE NOT TO BE USED ON OTHER PROJECT OR EXTENSIONS TO THE PROJECT OR OTHER SIMILAR PROJECT EXCEPT BY WRITTEN AGREEMENT AND WITH APPROPRIATE PROFESSIONAL FEES TO THE CONSULTANT.
1. GENERAL NOTE FOR DESIGN
1.1 DESIGN METHOD USED IS USED ACCORDING TO BANGLADESH NATIONAL BUILDING CODE (BNBC) 2020
1.2 ALL THE STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTURAL DRAWINGS.
1.3 BASIC WIND SPEED = 65.7 m/s
1.4 SEISMIC ZONE - 02

2. MATERIAL SPECIFICATION:
2.1 CONCRETE
a) TYPE: ALL CONCRETE COMPRRESSIVE STRENGTH FOR 28 DAYS CONSIDERED AS FOLLOWS
1) f’c = 36 Mpa at 28 DAYS CYLINDER STRENGTH USING STONE CHIPS
   (TO BE DETERMINED BY TRIAL MIX DESIGN)
   FOR MAT, COLUMN, LIFT CORE, SHEAR WALL, BEAM, SLAB & U.G.W.R. UP TO 5TH FLOOR
2) f’c = 32Mpa at 28 DAYS CYLINDER STRENGTH USING STONE CHIPS
   (TO BE DETERMINED BY TRIAL MIX DESIGN) FOR MAT, COLUMN, LIFT CORE, SHEAR WALL,
   BEAM, SLAB, MACHINE ROOM & O.H.W.T. FROM 5TH FLOOR TO ROOF
3) f’c = 21Mpa at 28 DAYS CYLINDER STRENGTH USING STONE CHIPS
   (TO BE DETERMINED BY TRIAL MIX DESIGN) FOR R.C.C. PILE
4) f’c = 18Mpa AT 28 DAYS CYLINDER STRENGTH USING GASS BURN BRICK CHIPS
   MIX RATIO 1:2:4 (FOR LINTEL, FALSE SLAB, BOUNDARY WALL, PARAPET, DROP WALL)
   b) MINIMUM CYLINDER STRENGTH BASED ON CYLINDER TEST OF
      DIAMETER D =100 or 150mm & HEIGHT 200 or 300mm
      i) 28 DAYS STRENGTH AS SPECIFIED IN 2.1a
      ii) 7 DAYS STRENGTH = 70% OF THE 28 DAYS STRENGTH.
   c) CURING OF R.C.C. WORK:
      i) CURING TIME MINIMUM 28 DAYS
      ii) METHOD OF CURING:
         * HORIZONTAL SURFACE - BY PONDING OF WATER

   * OTHER SURFACES - BY WRAPPING MOIST JUTE FABRIC AND SPRINKLING WATER BY HOSE PIPE FREQUENTLY.
   * USE CONCRETE ADMIXTURE FOR U.G.W.R.

2.2 CEMENT
As per BDD EN 197-1:2003, Type CEM-I or CEM-I/IA-M or CEM-II/A-V or CEM-II/A-W
TESTS: i) Setting time & soundness by EN 196-3, ii) Strength by EN 196-1, iii) Fineness by EN 196-6.

2.3 CONCRETE AGGREGATE
a) FINE AGGREGATES:
   i) 100% Sylhet Sand( M. 2.5mm.) For All Structural Concrete.
   ii) 100% Local Sand (FM-1.7) for Non-Structural Component e.g. Floor Finish, Plastering Work.
   b) COARSE AGGREGATES:
      CRUSHED NATURAL, STONE CHIPS WITH MAXIMUM SIZE OF 28MM.
      ALL COARSE AGGREGATE MUST BE WELL GRADED AND FREE FROM DUST.
      AGGREGATE GRADING SHALL MEET THE REQUIREMENTS OF ASTM C33/C33M-13
      SPECIFICATION.
      LOSS ANGELES ABRASION VALUE SHALL NOT EXCEED 30% (FOR GRADING B)

2.4 WATER
   POTABLE WATER TO BE USED IN CONCRETE MIX

2.5 STEEL REINFORCEMENT
   a) ALL REINFORCEMENTS ARE 400 Mpa HIGH STRENGTH DEFORMED BAR.
   b) YIELD STRENGTH OF STEEL (fy = 400 Mpa) CONFORMED TO ONE OF THE FOLLOWING SPECIFICATIONS:
      i) BS 1383 : 1991  ii) ASTM A615M
   c) TESTS: i) UNIT WEIGHT, YIELD STRENGTH, ULTIMATE STRENGTH AND ELEVATION (BY ISO-6992-1:2009).
      ii) BEND TEST BY ISO-7439-2005, iii) DEFORMATION MEASUREMENT.

3. MORTAR RATIO:
   a) PLASTER MORTAR RATIO: 1:4
   a) BRICK WORK MORTAR RATIO: 1:4
4. SCHEDULE FOR REMOVING FORM WORK:

a) VERTICAL SIDES
   i) FOR BEAM = 3 weeks.
   ii) COLUMN = 72 hr.

b) BOTTOM SIDES:
   ALLOW MINIMUM ONE DAY PER FEET OF
   BEAM SPAN LENGTH BUT NOT LESS THAN 21 DAYS.
   c) SLAB = MINIMUM 28 DAYS.

5. DETAILS

5.1 HOOKS OF REBAR

FOR ALL RE-BAR PROVIDE 90° STANDARD HOOKS (-BENT) IF NOT SHOWN
IN THE DRAWINGS.

5.2 SPACER BARS

TO SUPPORT SECOND LAYER BARS IN BEAMS / SLABS, USE Ø25 SPACER BARS
@ 750mm WHERE REQUIRED.

5.3 CHAIRS

USE CHAIRS OF NECESSARY DIMENSION MADE OF Ø19/Ø12/Ø16 BAR TO
SUPPORT TOP BARS @750mm c/c.

6. LAP LOCATION:

a) FOR BEAM TOP & BOTTOM BAR, LAP NOT TO BE PROVIDED WITHIN 2 TIMES
   THE HEIGHT OF BEAM.

b) NOT MORE THAN 50% OF THE BARS SHALL BE SPLAICED AT ONE PLACE

c) LAP SPACES ARE TO BE CONFINED BY HOOPS WITH MAXIMUM SPACING
   OR PITCH OF 4d OR 100mm WHERE d IS THE EFFECTIVE DEPTH OF THE
   BEAM.

LAP SPACING LOCATION IN BEAMS:

Not more than 50% of bars shall be spliced at one place of the beam. Lap splices are to be confined
by hoops/strips with minimum spacing of 150mm.

LAP SPACING LOCATION IN COLUMNS:

Lap splices are to be confined by hoops/ties with minimum spacing of 120mm.

7. BEAM STIRRUP

Hooks in beam stirrups shall be bent 45° inward and length of the hook shall be minimum 75mm as
shown below. Stirrups shall be arranged such that corner hooks grab the main reinforcement in alternate
fashion.

8. END ANCHORAGE FOR HORIZONTAL REINFORCEMENT IN BEAM, SLAB, WALL ETC.

50 hooks shall be provided for 1 of main bars of beams (top and bottom) which terminate into column or
walls or other beams. (i) slab top bars terminating into supporting columns or walls. (ii) main reinforcement
terminating at the periphery.

For all cases, the length of the hook shall be 12 times the bar diameter (16d).
### 9. SCHEDULE OF LINTEL

<table>
<thead>
<tr>
<th>Width of lintel</th>
<th>Clear span</th>
<th>Size &amp; Rebar</th>
</tr>
</thead>
<tbody>
<tr>
<td>125mm</td>
<td>UP to 1800mm</td>
<td>8mm Ø @ 150mm c/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-12mmØ</td>
</tr>
<tr>
<td>125mm</td>
<td>1825 to 2700mm</td>
<td>8mm Ø @ 125mm c/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-12mmØ</td>
</tr>
<tr>
<td>250mm</td>
<td>UP to 1800mm</td>
<td>8mm Ø @ 150mm c/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-12mmØ</td>
</tr>
<tr>
<td>250mm</td>
<td>1825 to 2700mm</td>
<td>8mm Ø @ 150mm c/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-12mmØ</td>
</tr>
<tr>
<td>125mm</td>
<td>2725 to 3600mm</td>
<td>8mm Ø @ 125mm c/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-16mmØ</td>
</tr>
</tbody>
</table>

### 10. CONCRETE CLEAR COVER FOR REINFORCING BARS:

<table>
<thead>
<tr>
<th>Member</th>
<th>Location or Condition</th>
<th>Thickness of Cover mm</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footing</td>
<td>side</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>bottom</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Column</td>
<td>above ground level</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>below ground level</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Beam</td>
<td>indoors face: top, side &amp; bottom</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>outdoors face: top, side &amp; bottom</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Slab and Stair</td>
<td>top</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>bottom</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>R.C.C WALL BELOW GROUND</td>
<td>exterior</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(200mm &amp; above)</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>interior</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>O.H. water tank</td>
<td>water face</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>other face</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>U.G. water tank</td>
<td>water face</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>other face</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

* from tie ** from stimups
# 11. Earthquake Consideration:

a) **Lap Length & Development Length:**

Unless otherwise mentioned in the drawings, lap length of bars shall be:

\[ f'c = 4600 \text{ psi} \] (32 Mps) and \( f_y = 60000 \text{ psi} \) (414 Mpa)

Class-B Lap Splice Length for Deformed Ms Rebar (rounded to nearest 25mm)

<table>
<thead>
<tr>
<th>Bar dia</th>
<th>Tension rebar</th>
<th>Bottom bars in slab, beam and mat; top bars in slab of thickness less than 300mm</th>
<th>Vertical compression rebar in column and shear wall</th>
<th>Development Length of Hooked Deformed Bars in Tension, ( l_{dh} ) (rounded to nearest 25mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>8</td>
<td>475</td>
<td>375</td>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>10</td>
<td>600</td>
<td>450</td>
<td>300</td>
<td>150</td>
</tr>
<tr>
<td>12</td>
<td>725</td>
<td>550</td>
<td>350</td>
<td>150</td>
</tr>
<tr>
<td>16</td>
<td>950</td>
<td>725</td>
<td>475</td>
<td>175</td>
</tr>
<tr>
<td>20</td>
<td>1200</td>
<td>925</td>
<td>600</td>
<td>250</td>
</tr>
<tr>
<td>22</td>
<td>1650</td>
<td>1275</td>
<td>650</td>
<td>300</td>
</tr>
<tr>
<td>25</td>
<td>1875</td>
<td>1450</td>
<td>750</td>
<td>350</td>
</tr>
<tr>
<td>28</td>
<td>2100</td>
<td>1600</td>
<td>850</td>
<td>425</td>
</tr>
<tr>
<td>32</td>
<td>2400</td>
<td>1850</td>
<td>950</td>
<td>525</td>
</tr>
<tr>
<td>36</td>
<td>2700</td>
<td>2075</td>
<td>1075</td>
<td>625</td>
</tr>
</tbody>
</table>

- Critical Section

- No. 3 through No.8
- No. 9, No.10, and No.11
- No. 14 and No.18
12. AVOIDING CONFLICT BETWEEN BEAM AND COLUMN REINFORCEMENT

If conflict arises between beam and column or wall reinforcement when beam steel enters or passes through column, the beam reinforcement may be horizontally bent inwards into the column as shown in the following figure.

13. REINFORCEMENT DETAILING AROUND VOID/OPENING

Reinforcement details around void/opening shall be as shown in figure below. The detailing is valid for maximum void size of 900 x 900. For void/opening of larger size contact the consultant.

14. COLUMN OFFSET DETAIL:

When column size is reduced the transition of column main reinforcement from lower floor to upper floor shall be detailed as shown below.

15. BRICK WORK:

All brick work shall use first class brick or as specified by the consultant. Mortar for brick work shall constitute 1:4 mix ratio (cement:sand). Mortar for plastering work shall be 1:4 mix ratio (cement:sand).

16. END ANCHORAGE OF BEAM REINFORCEMENT:

Minimum end anchorage length of reinforcement as shown below for different bar sizes must be maintained throughout.
17. CONSTRUCTION JOINT IN MAT

Notes on construction joint in mat:
1. Construction joint shall be located midway between column/floor wall.
2. Shear key as shown in the Fig. at left shall be provided.
3. Optionally, a PVC water stopper as shown may be provided.
4. Width of the stopper shall be a minimum 300mm for mat foundation.
5. Before casting the new concrete, the old surface must be thoroughly cleaned and heavily roughened by chipping.
6. An approved bonding agent shall be applied over the surface of the old concrete before the new concrete is cast.
7. Time difference between application of bonding agent and placing new concrete shall not exceed the limit prescribed by the manufacturer of bonding agent.
8. The contractor must ensure that the construction joint becomes fully sealed and no leakage of water occurs in future.

18. CONSTRUCTION JOINT IN CONCRETE WALL

30mm clear cover inside Wall

19. MAT REINFORCEMENT DETAILS AROUND DEAD PILE

Dead pile

Mat reinforcement

10m @ 300 c/c
4-50 in.

Dead pile surface thoroughly cleaned and heavily roughened by chipping and bonding agent applied.

Shovel Scoop

Mat bottom

Section A-A

[Dead pile section at shear keys]

Typical Details of Voided 250 Roc Wall

20. MISCELLANEOUS STRUCTURAL DETAILS

The miscellaneous details shown below shall be followed wherever applicable unless otherwise mentioned elsewhere.

Typical Details of Voided 250 Roc Wall
NOTE:

1. Concrete mix for shore piles shall be with 20mm down graded stone chips as coarse aggregate and 100% Sylhet sand of F.M. 2.2-2.5 as fine aggregates.

2. Minimum Cement content shall not less than 350 kg/m3(use mix design)

3. Minimum cylinder strength of concrete at 28 days shall be 24 Mpa

4. No boring operations shall be nearer than 3m (clear) from any pile in which concreting is in progress nor from completed pile until at least 72 hours have elapsed.

5. All pile bars shall be deformed having fy = 400 W.

6. Coarse Aggregate-Stone chips (Clean, well graded and SSD Condition Needs to be Assured).

7. Slump 150mm-200mm.
   (w/c ratio maximum 0.44, add admixture & retarder)

8. Pile casting shall be done by using tremie pipe of 200mm diameter.

9. End of tremie pipe shall always remain in green concrete by at least 2.5m.

10. Use polymer slurry/ bentonite slurry as per AASHTO so that slump does not fall below 120mm during casting(need slump retention test).
CENTER LINE OF SHORE PILE

16 SWG Wire Mesh Line

75 mm Thick Ferrocement

Ø8mm Steel Nailing/Rowel plug @2-0"c/c

16 SWG Wire Mesh With 20 mm Opening

CONSTRUCTION PROCESS OF FERROCEMENT