## 1. GENERAL:

1.1– NOTES GIVEN ON THIS DRAWING ARE APPLICABLE TO ALL ARCHITECTURAL AND STRUCTURAL DRAWINGS UNLESS OTHERWISE NOTED.

1.2– ALL DRAWINGS SHOULD BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTURAL DRAWINGS AND SPECIFICATION.

1.3– HBP SHALL COORDINATE ALL DRAWINGS OF ALL DISCIPLINES FOR ALL ITEMS INCLUDING BUT NOT LIMITED TO SIZES AND LOCATION OF ALL OPENINGS FOR DUCT, PIPES AND PIPE SLEEVES, NUTS AND OTHER SUCH ITEMS TO BE EMBEDDED IN CONCRETE OR OTHERWISE INCORPORATED IN STRUCTURAL WORKS.

1.4– HBP SHALL BRING TO THE NOTICE OF THE ENGINEER DISCREPANCIES OR AMBIGUITIES IN DRAWINGS IF ANY, FOR HIS CLARIFICATIONS/INSTRUCTIONS, PRIOR TO THE START OF WORK.

1.5– HBP SHALL PREPARE AND SUBMIT CONSTRUCTIONAL METHODOLOGY & WORK SCHEDULE, BAR BENDING SCHEDULES FOR ENGINEERS APPROVAL AND OBTAIN THE SAME BEFORE PROCEEDING WITH THE WORK. HBP SHALL BE SOLELY RESPONSIBLE FOR WORKABILITY OF HIS METHODOLOGY, AND BAR BENDING SCHEDULES. THE ENGINEERS APPROVAL SHALL NOT RELIEVE HBP OF HIS RESPONSIBILITY UNDER THE CONTRACT.

1.6– HBP SHALL VERIFY ALL LAYOUTS, CONFIGURATIONS, DIMENSIONS AND LEVELS PERTAINING TO WORKS BEFORE PROCEEDING WITH THE WORK. HE SHALL ALSO COORDINATE SCHEDULE OF CONSTRUCTION WITH SUPPLY AND INSTALLATION OF EQUIPMENT BY OTHERS.

1.7– HBP SHALL BE RESPONSIBLE TO ENSURE THE SAFETY AND STABILITY OF THE STRUCTURE, AND SAFETY OF THE LIFE OF WORKERS AND PROPERTY DURING THE WORK, HBP SHALL EXERCISE ALMOST CARE AND PRECAUTION TO AVOID ANY MISHAP OR ACCIDENT. PROPER AND ADEQUATE MEASURES SHALL BE TAKEN BY HBP ACCORDINGLY.

1.8– ALL UTILITIES CABLES, PIPE'S AND EXISTING STRUCTURAL ELEMENTS SHALL BE PROTECTED DURING EXECUTION OF THE WORK BY HBP. ANY ITEMS DAMAGED OR DESTROYED DUE TO CONTRACTORS CARELESSNESS OR NEGLIGENCE SHALL BE REPAIRED OR REPLACED USING MATERIAL OF SAME TYPE OR APPROVED EQUIVALENT QUALITY BY HBP AT HIS OWN COST.

1.9– ALLOWABLE BEARING CAPACITY SHALL BE AS PER DETAIL GEOTECHNICAL REPORT.

1.10– ALL MATERIAL AND WORKMANSHIP SHALL CONFORM TO RELEVANT APPROVED INTERNATIONAL STANDARD. IN THEABSENCE OF ANY EXPRESSED OR IMPLIED SPECIFICATION IN THE CONTRACT, ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO RELEVANT INTERNATIONAL STANDARDS.

## 2. PLANT COORDINATE SYSTEM & REFERENCE BENCH MARKS:

2.1– ALL ELEVATIONS ARE WITH REFERENCE TO SURVEY PLAN.

2.2– PLANT PROPOSED FINISHED GROUND LEVEL (FGL) SHALL AS PER NGP–000–SCW–15.01–2006–23 GRADING & VERTICAL PLAN.

2.3– FOR ALL THE PLANT COORDINATES & REFERENCE BENCH MARKS REFER TO NGP–000–SCW–15.01–2006–23 GRADING & VERTICAL PLAN.

## 3. DIMENSIONS:

3.1– SYSTEM OF UNITS IS METRIC. ALL DIMENSIONS ARE MENTIONED IN MILLIMETERS EXCEPT ELEVATION WHICH ARE SPECIFIED IN METERS UNLESS OTHERWISE NOTED.

## 4. MATERIALS:

4.1– ALL REINFORCING BARS SHALL BE DEFORMED BAR CONFORMING TO ASTM A615 HAVING A SPECIFIED YIELD STRENGTH OF NOT LESS THAN 420 MPa, WHICH IS DENOTED WITH "T" IN DRAWINGS.

4.2– WELDED WIRE FABRIC.
–ASTM A 185 FOR FIRE PROOF CONCRETE.
–ASTM A884 FOR OTHERS.

4.3– STRUCTURAL STEEL.
STEEL COVER, GRATING, CHEQUERED PLATE AND OTHER MISCELLANEOUS STEEL CONFORMING TO ASTM A36 OR EQUIVALENT.

4.4– PIPES AND FITTINGS.
(1) CSP (CARBON STEEL PIPE) AND FITTINGS.
– API 5L GRADE B ELECTRIC RESISTANCE WELD FOR PIPE DIAMETER 24" OR LESS .
– API 5L GRADE B SUBMERGED ARC WELD FOR PIPE DIAMETER 26" OR OVER.
(2) PVC PIPES AND FITTINGS (FOR STRAIGHT PORTION).
(2.1) FOR CONDUIT PIPES FOR ELEC/INST CABLES (WITH/WITHOUT CONCRETE PROTECTION).
– PIPE : ASTM D2729
– JOINT : ADHESIVE JOINT (SOCKET JOINT).
(2.2) FOR SANITARY AND CHEMICAL SEWERS.
– PIPE : ASTM F441 M OR EQUIVALENT
– JOINT : ADHESIVE JOINT (SOCKET JOINT) OR FLANGED JOINT
(3) PE PIPE (FOR BENDING PORTION).

4.5– CAST IRON MANHOLE COVER.
MANUFACTURE'S STANDARD CAST IRON. (GAS SEALED TYPE)
FOR AREA WHERE HEAVY TRAFFIC OR OTHER HEAVY LOADINGS ARE ANTICIPATED, HEAVY DUTY MANHOLE COVERS SHALL BE USED.

4.6– WATER STOPER.
POLYVINYL CHLORIDE CENTRAL BULB TYPE.

4.7– JOINT FILLER.
ASTM D994, D1751, OR APPROVED EQUIVALENT.

4.8– JOINT SEALANT (HYDROCARBON RESISTANT TYPE).
ASTM D2628 (HOT APPLICATION), BS 5212 TYPE F (COLD APPLICATION), OR APPROVED EQUIVALENT.

4.9– POLYETHYLENE SHEET FOR VAPOUR BARRIER THICKNESS SHALL BE 0.15mm AS MINIMUM.

4.10– MILD STEEL BOLT AND NUTS ASTM A307 GRADE B, OR EQUIVALENT.

4.11– WELDING FOR CARBON STEEL ELECTRODES SHALL CONFORM TO:
AWS CODE A5. 1 E70 SERIES.
AWS CODE A5.1 E60 SERIES. (FOR LADDER, HANDRAIL AND FLOORING ONLY).

4.12– MORTAR.
–MIXING
CEMENT GROUT / CEMENT –SAND WEIGHT RATIO 1:4
–MATERIAL
SAND : FINE AGGREGATE ASTM C33.
CEMENT : ASTM C150 TYPE–1/TYPE–4.

4.13– CHAMFER.
ALL EXPOSED CORNER OF CONCRETE ABOVE GROUND SHALL CHAMFERED BY 25mm.

## 5. FOUNDATION AND STRUCTURE WORK:

5.1– HBP SHALL STUDY AVAILABLE SOIL REPORT BEFORE COMMENCING WORK.

5.2– ALL CONCRETE SHALL BE TESTED IN ACCORDANCE WITH BS/ASTM STANDARDS AND SHALL COMPLY WITH BS/ASTM STANDARDS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS. CONTRACTOR SHALL PREPARE AT LEAST 6 SAMPLES FOR EACH POUR & SHALL SUBMIT THE TEST REPORTS TO THE ENGINEER FOR 7 & 28 DAYS (3 FOR EACH) CRUSHING STRENGTH AS PER SPECIFICATIONS.

| MIN CYLINDER CRUSHING STRENGTH AT 28 DAYS(Fc') | TYPE OF STRUCTURE |
|---|---|
| 32 MPa | |
| 28 MPa | SUPER STRUCTURE |
| 21 MPa | SUBSTRUCTURE |
| 17 MPa | FLOOR |
| 12 MPa | FLOOR |
| 10 MPa | LEAN CONCRETE |

5.3– ALL REINFORCING STEEL SHALL BE HELD FIRMLY IN PLACE BEFORE AND DURING THE PLACING OF CONCRETE BY MEANS OF WIRES AND SUPPORTS ADEQUATE TO PREVENT DISPLACEMENT DURING THE COURSE OF CONSTRUCTION.

5.4– BEFORE CASTING OF ANY STRUCTURAL MEMBER, HBP SHALL ENSURE THAT ALL EMBEDDED ITEMS FOR ELECTRICAL, MECHANICAL, HVAC, PLUMBING, STRUCTURAL STEEL, AND OTHER WORKS, AND DOWELS FOR STRUCTURAL MEMBERS AND ARE PROPERLY LOCATED IN PLACE.

5.5– CONSTRUCTION JOINTS NOT SHOWN ON THE DRAWINGS SHALL BE SO MADE AND LOCATED AS TO NO IMPAIR THE STRENGTH OF THE STRUCTURE AND SHALL NEED PRIOR APPROVAL OF THE ENGINEER.

5.6– MANUFACTURING OF PRECAST CONCRETE ELEMENTS SHALL BE DONE IN STRICT CONFORMANCE WITH THE RELEVANT STANDARDS.

5.7– APPROVED STAKING, HANDLING & LIFTING DEVICE SHALL BE USED FOR ERECTION OF PRECAST ELEMENTS & GIRDERS.

5.8– HBP MAY USE PLASTICIZER TO ACHIEVE REQUIRED WORKABILITY OF CONCRETE MIX AS APPROVED BY THE ENGINEER.

5.9– WATER/CEMENT RATIO SHALL NOT EXCEED 0.40 OR AS INDICATED IN MIX DESIGN.

5.10– CLEAR COVER TO REINFORCEMENT TO BE
a) 20mm IN SLAB,
b) 40mm. IN COLUMN, BEAMS & WALLS
c) 60mm IN FOOTINGS.
d) PEDESTAL TOP COVER = 25mm.

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CONTRACTOR.
HONG KONG HUIHUA GLOBAL TECHNOLOGY LIMITED

PROJECT NO.
NASHPA 1247

PROJECT TITLE: NASHPA GAS PROCESSING AND LPG RECOVERY PLANT PROC-FC-CB/NASHPA/PROJ-1247/2015

DRAWING NO.
NGP–000–SCW–15.01–0001–00

DRAWING TITLE: GENERAL NOTES FOR REINFORCED CONCRETE WORKS

| REV. | SCALE | SHEET |
|---|---|---|
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5.12– NO CONCRETE SHALL BE POURED UNTIL STEEL PLACEMENT HAS BEEN APPROVED BY THE ENGINEER/OWNER.
5.13– POTABLE WATER SHALL BE USED FOR MIXING AND CURING OF CONCRETE.
5.14– ANCHOR BOLTS TO BE FIXED IN POSITION BY MEANS OF TEMPLATE TO ENSURE THEIR LOCATION DURING CONCRETING.
5.15– CUTTING, PLACING & OVER LAPPING OF STEEL REINFORCEMENT SHALL BE AS PER ACI CODE LATEST EDITION.
5.16– BAR BENDING DETAILS SHALL COMPLY WITH ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".

## 6. STANDARD HOOKS FOR UNCOATED REBARS:

6.1– DETAILS AND DIMENSIONS OF STANDARD HOOKS ARE AS FOLLOWS

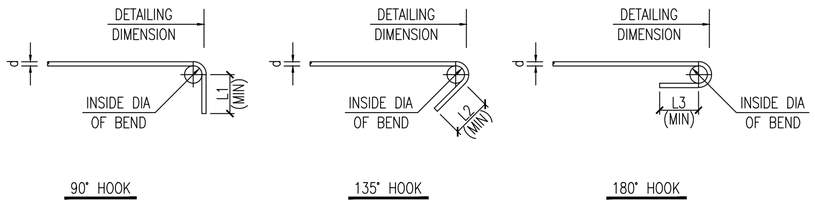


TABLE 1A. STIRRUPS AND THE HOOKS (UNIT:mm)

| NOMINAL SIZE | | T10 | T12 |
|---|---|---|---|
| MIN INSIDE DIA OF BEND | | 40 | 48 |
| 90° HOOK | L1 | 60 | 75 |
| 135° HOOK | L2 | 60 | 75 |

TABLE 1B. STANDARD HOOKS FOR DEVELOPMENT (UNIT:mm)

| NOMINAL SIZE | | T12 | T16 | T20 | T25 |
|---|---|---|---|---|---|
| MIN INSIDE DIA OF BEND | | 72 | 96 | 120 | 150 |
| 90° HOOK | L1 | 145 | 195 | 240 | 300 |
| 180° HOOK | L3 | 65 | 65 | 80 | 100 |

## 7. STANDARD DEVELOPMENT LENGTH FOR RE BARS

7.1– THE MINIMUM EMBEDMENT OR ANCHORAGE LENGTH FOR INDIVIDUAL BAR SHALL BE IN ACCORDANCE WITH TABLE 2, 3, 4 UNLESS OTHERWISE NOTED ON EACH DESIGN DRAWING.
7.2– THE VALUES IN TABLE 2, 3, 4 ARE CALCULATED BASED ON THE FOLLOWING CONDITIONS:
a: SPECIFIED YIELD STRENGTH OF REBAR : Fy = 420 MPa
b: UNCOATED DEFORMED BARS.

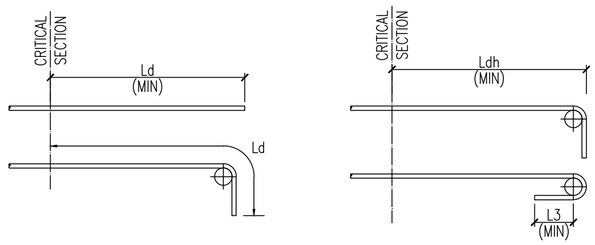


TABLE 2. TENSION DEVELOPMENT LENGTH WITHOUT STANDARD HOOK (Ld)(UNIT:mm)

| NOMINAL SIZE | | T10 | T12 | T16 | T20 | T22 | T25 | REMARKS |
|---|---|---|---|---|---|---|---|---|
| Ld FOR fc'= 21 MPa | TOP BAR (NOTE a) | 560 | 740 | 915 | 1095 | 1600 | 1830 | CONC. COVER BELOW BARS ⩾ 300 |
| | OTHERS | 435 | 560 | 710 | 840 | 1220 | 1400 | CONC. COVER BELOW BARS < 300 |
| Ld FOR fc'= 28 MPa | TOP BAR (NOTE a) | 480 | 635 | 785 | 940 | 1370 | 1575 | CONC. COVER BELOW BARS ⩾ 300 |
| | OTHERS | 380 | 480 | 610 | 735 | 1065 | 1220 | CONC. COVER BELOW BARS < 300 |

TABLE 3. COMPRESSION DEVELOPMENT LENGTH WITHOUT STANDARD HOOK (UNIT:mm)

| NOMINAL SIZE | | T10 | T12 | T16 | T20 | T22 | T25 | REMARKS |
|---|---|---|---|---|---|---|---|---|
| Ld | fc'=21MPa | 230 | 280 | 355 | 430 | 480 | 560 | |
| | fc'=28MPa | 200 | 255 | 305 | 380 | 430 | 490 | |

7.3– MINIMUM DEVELOPMENT OF REBAR (Ldh) WITH STANDARD HOOK SHALL BE IN ACCORDANCE WITH TABLE 3,UNLESS OTHERWISE NOTED ON EACH DESIGN DRAWING.

TABLE 4. MINIMUM DEVELOPMENT LENGTH WITH STANDARD HOOK (UNIT:mm) (FOR fc'=21MPa)

| NOMINAL SIZE | T10 | T12 | T16 | T20 | T25 |
|---|---|---|---|---|---|
| Ldh | 185 | 220 | 295 | 370 | 460 |
| L1 | 120 | 145 | 195 | 240 | 300 |
| L3 | 65 | 65 | 65 | 80 | 100 |

## 8. LAP SPLICE LENGTH FOR REBARS:

8.1– MINIMUM LAP LENGTH AT SPLICE (DESIGNATED AS Ls) SHALL BE IN ACCORDANCE WITH TABLE 5, 6 UNLESS OTHERWISE NOTED.
8.2– THE VALUES IN TABLE 5, 6 ARE CALCULATED BASED ON THE FOLLOWING CONDITIONS:
a. SPECIFIED YIELD STRENGTH OF REBAR : Fy = 420 MPa
b. UNCOATED DEFORMED BARS.
8.3– LAP SPLICES SHALL BE COMPLETELY STAGGERED IN BEAM,FOUNDATION AND PREFERABLY STAGGERED IN SLAB OR WALL UNO.
8.4– THE LAP LENGTH FOR BARS OF UNEQUAL SIZES SHALL BE BASED UPON THE SMALLER ONE.

TABLE 5. MINIMUM TENSION LAP LENGTH (Ls)(UNIT:mm)

| NOMINAL SIZE | | T10 | T12 | T16 | T20 | T22 | T25 | REMARKS |
|---|---|---|---|---|---|---|---|---|
| Ls FOR fc'= 21 MPa | TOP BAR (NOTE a) | 710 | 940 | 1195 | 1420 | 2055 | 2360 | CONC. COVER BELOW BARS ⩾ 300 |
| | OTHERS | 560 | 740 | 915 | 1090 | 1600 | 1830 | CONC. COVER BELOW BARS < 300 |
| Ls FOR fc'= 28 MPa | TOP BAR (NOTE a) | 610 | 815 | 1015 | 1220 | 1780 | 2035 | CONC. COVER BELOW BARS ⩾ 300 |
| | OTHERS | 485 | 635 | 785 | 940 | 1370 | 1575 | CONC. COVER BELOW BARS < 300 |

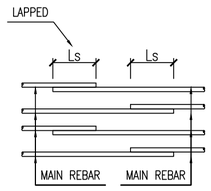


TABLE 6. MINIMUM COMPRESSION LAP LENGTH (UNIT:mm)

| NOMINAL SIZE | T10 | T12 | T16 | T20 | T22 | T25 |
|---|---|---|---|---|---|---|
| Ls | 305 | 380 | 485 | 585 | 690 | 760 |

## 9. CLEAR SPACING OF REBAR

9.1– MINIMUM CLEAR SPACING BETWEEN PARALLEL REBAR IN SLAB/WALL AND BETWEEN LONGITUDINAL REBAR IN BEAM/COLUMN SHALL CONFORM TO PARA 7.6 OF ACI–318.

NOTE:
a. WHEN HORIZONTAL REINFORCEMENT IS SO PLACED THAT MORE THAN 300 mm OF FRESH CONCRETE IS CAST IN THE MEMBER SPLICE. OTHERWISE IT SHALL BE CATEGORIZED AS "OTHER".

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