



**Republic of the Philippines**  
**PHILIPPINE CHILDREN'S MEDICAL CENTER**  
**Bids and Awards Committee**

Quezon Avenue, Quezon City 1100

588-9900 loc 361 Website: [www.pcmc.gov.ph](http://www.pcmc.gov.ph) email: bac@pcmc.gov.ph

## **SECTION I**

# **Invitation to Bid**

## **One (1) Lot Supply of Labor, Materials, Equipment and Furniture in the Construction of Doctor's Private Clinic Extension**

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**IB No. 2019-152**



## INVITATION TO BID IB 2019-152

The **Philippine Children's Medical Center**, through **GAA/COB 2019** intends to apply the sum of **Thirteen Million Four Hundred Sixty Thousand Two Hundred Sixty-Four Pesos (Php13,460,264.00)** being the Approved Budget for the Contract (ABC) to payment under the contract for the following project. Bids received in excess of the ABC shall be automatically rejected at bid opening.

Item Description	Approved Budget for the Contract	Cost of Bidding Documents
<b>One (1) Lot Supply of Labor, Materials, Equipment and Furniture in the Construction of Doctor's Private Clinic Extension</b>	<b>13,460,264.00</b>	<b>25,000.00</b>

The PCMC, through its Bids and Awards Committee now invites bids for the above-mentioned project. Completion of the Works is required in Ninety (90) calendar days. Bidders should have completed a contract similar to the Project as specified in **ITB** Clauses 5.4 and 12.1. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II. Instructions to Bidders.

Bidding will be conducted through open competitive bidding procedures using a non-discretionary "pass/fail" criterion as specified in the 2016 Revised Implementing Rules and Regulations (IRR) of Republic Act (RA) 9184, otherwise known as the "Government Procurement Reform Act".

Bidding is restricted to Filipino citizens/sole proprietorships, cooperatives, and partnerships or organizations with at least Sixty percent (60%) interest or outstanding capital stock belonging to citizens of the Philippines.

All Bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 18. Bids will be opened in the presence of the bidders' representatives who choose to attend at the address below. Late bids shall not be accepted.

### SCHEDULE OF ACTIVITIES

1. Availability of Bidding Documents (start) : October 28, 2019
2. Pre-bid Conference : November 5, 2019  
10:00 A.M. Training Room 4
3. Submission of Eligibility, Technical and Financial Requirements : On or before November 25, 2019  
9:30 A.M., Director's Office
4. Opening of Bids : November 25, 2019  
10:00 A.M., Training Room 4

The Philippine Children's Medical Center reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Section 41 of RA9184 and its IRR, without thereby incurring any liability to the affected bidder or bidders.

Interested bidders may obtain further information and inspect the bidding documents at PCMC-BAC Secretariat Office with Tel. No. **924-0870** or **588-9900** local **361** from **8:00 am to 5:00 pm**.

  
**SHEILA ANN D. MASANGKAY, MD, MHSA**  
Chairperson  
Bids and Awards Committee





**Republic of the Philippines**  
**DEPARTMENT OF HEALTH**  
**PHILIPPINE CHILDREN'S MEDICAL CENTER**  
**Bids and Awards Committee**  
Quezon Avenue, Quezon City 1100  
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## **SECTION III**

# ***Bid Data Sheet***

## **One (1) Lot Supply of Labor, Materials, Equipment and Furniture in the Construction of Doctor's Private Clinic Extension**

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**IB No. 2019-152**

## Bid Data Sheet

ITB Clause	
1.1	<p>The Procuring Entity is</p> <p><b><i>PHILIPPINE CHILDREN'S MEDICAL CENTER (PCMC)</i></b></p>
1.2	<p>The name of the Contract is:  <a href="#">One (1) lot Supply of Labor, Materials, Equipment &amp; Furniture in the Construction of Doctor's Private Clinic Extension</a></p> <p>The identification number of the Contract is <b><i>IB-2019-152</i></b></p> <p>The lot(s) and reference is/are:  <a href="#">Supply of Labor, Materials, Equipment &amp; Furniture in the Construction of Doctor's Private Clinic Extension</a></p>
2.	<p>The Funding Source is:</p> <p>The Government of the Philippines (GOP) through <b><i>GAA/COB 2019</i></b> in the amount of <b><i>Thirteen Million Four Hundred Sixty Thousand Two Hundred Sixty-Four Pesos (Php13,460,264.00)</i></b></p> <p>The name of the Project is:  <a href="#">One (1) lot Supply of Labor, Materials, Equipment &amp; Furniture in the Construction of Doctor's Private Clinic Extension</a></p> <p>The Philippine Children's Medical Center reserves the right to reject bids, declare failure of bidding or not to award the contract without incurring any liability in accordance to Section 41 of the RA 9184 and its IRR. <i>(e.g. if the funds/allotments for the said project have been withheld or reduced through no fault of its own)</i></p>
3.1	No further instructions.
5.1	No further instructions.
5.2	Bidding is restricted to eligible bidders as defined in ITB Clause 5.1.
5.4(b)	For this purpose, similar contracts shall refer to contracts which have the same major categories of work. <a href="#">(Construction or Renovation Project with Civil/Architectural, Electrical/Auxiliary, Mechanical Works with at least 50% of the Total Contract Price)</a>
8.1	<p><a href="#">Subcontracting is allowed for Air-conditioning System. However, subcontracting of any portion shall not relieve the bidder from any liability or obligation that may arise from the contract from this project.</a></p> <p><a href="#">Subcontractor must submit the documentary requirements under <b>ITB Clause 12 (BDS 12.1)</b> and comply with the eligibility criteria specified in the <b>BDS</b></a></p> <ol style="list-style-type: none"> <li><a href="#">1. Registration Certificate from SEC, Department of Trade and Industry for sole proprietorship, or CDA for cooperatives, or any proof of such registration.</a></li> <li><a href="#">2. Mayor's Permit issued by the City or Municipality where the principal place of business of the prospective bidder is located.</a></li> <li><a href="#">3. Tax Clearance per Executive Order No. 398, series of 2005, as finally reviewed and approved by BIR.</a></li> <li><a href="#">4. Special PCAP Licenses specifically for: <ul style="list-style-type: none"> <li>• <a href="#">Air-Conditioning System: Small B License Category C</a></li> </ul> </a></li> </ol>

	<p style="text-align: center;">and D</p> <p>In the event that any subcontractor is found by the Procuring Entity to be ineligible, the subcontracting of such portion of the works shall be disallowed.</p> <p>The Bidder may identify the subcontractor to whom a portion of the work will be subcontracted at any stage of the bidding process or during contract implementation. If the Bidder opts to disclose the name of the subcontractor during bid submission, the Bidder shall include the required documents as part of the technical component of its bid. Subcontractors shall be approved by PCMC.</p> <p><b><i>NOTE: The contractor shall undertake not less than 50% of the contracted works with its own resources.</i></b></p>
8.2	<p>Eligibility Criteria for Subcontractor:</p> <ol style="list-style-type: none"> <li>1. At least one (1) similar contracts with at least 50% of the bid for installation of Air-conditioning System which must be supported with client's acceptance.</li> <li>2. Track Record of the Company</li> </ol>
9.1	<p>The Procuring Entity will hold a pre-bid conference for this Project on: <b><i>Refer to Invitation to Bid/Bid Bulletin</i></b></p>
10.1	<p>Requests for clarification(s) on any part of the Bidding Documents or for an interpretation must be in writing and submitted to the BAC of the Procuring Entity concerned at least ten (10) calendar days before the deadline set for the submission and receipt of bids.</p> <p>The Procuring Entity's address is: <b><i>Quezon Avenue corner Agham Road, Quezon City</i></b></p> <p><b><i>BAC Secretariat 8924-0870 or 8588-9900 local 361.</i></b></p> <p>The Supplier's address for Notices is:</p> <p>_____</p> <p><i>Address</i></p> <p>_____</p> <p><i>name of contact</i></p> <p>_____</p> <p><i>fax and telephone number</i></p> <p>_____</p> <p><i>e-mail address</i></p>



12.1

The Bidder shall submit the following **ELIGIBILITY AND TECHNICAL DOCUMENTS ARRANGED, NUMBERED AND TABBED** **[Strictly NO using of staple wire and thick materials for tabs]** as enumerated below:

Use of indelible ink **color blue** shall be used by the authorized signatory in signing the required forms.

**(a) Eligibility Documents**

**Class "A" Documents**

1. Registration Certificate from SEC, Department of Trade and Industry (DTI) for sole proprietorship, or CDA for cooperatives.
2. Mayor's/Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located or the equivalent document for Exclusive Economic Zones or Areas.  
In cases of recently expired Mayor's/Business permits, it shall be accepted together with the official receipt as proof that the bidder has applied for renewal within the period prescribed by the concerned local government unit, provided that the renewed permit shall be submitted as a post-qualification requirement in accordance with Section 34.2 of this IRR.
3. Valid Tax Clearance per Executive Order 398, series of 2005, as finally reviewed and approved by the BIR.

*Note:*

*a. Bidders may still submit the Class "A" Eligibility Documents required to be uploaded and maintained current and updated in the PhilGEPS pursuant to Section 8.5.2 of the 2016 Revised IRR; or*

*b. If already registered in the PhilGEPS under Platinum category, the Certificate of Registration and Membership in lieu of the uploaded file of Class "A" Eligibility Documents; or*

*c. A combination thereof in case any of the earlier uploaded Class "A" Eligibility Documents has been expired.*

*In the event the bidder opted to submit only the Class "A" Eligibility Documents, the Certificate of PhilGEPS Registration (Platinum Membership) shall remain a post-qualification requirement to be submitted in accordance with Section 34.2 of the 2016 Revised IRR of RA 9184 (Pursuant to GPPB Circular 07-2017 dated 31 July 2017)*

4. Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid. **(Use of Form No. DOBA-PCMC-SCF3b is required)**

**Note:**

*Failure to include an immaterial on-going contract or failure to disclose complete information in the statement of contracts shall*

*result to the following:*

- a. Disqualification of the bidder for non-compliance with the eligibility requirement under Section 23.1 of the revised IRR.
  - b. Blacklisting under Section 65.3 (a) or (b) of the revised IRR
5. Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid (Refer to ITB Clause 5.4) within five (5) years from date of bid opening (*use of Form No. DOBA-PCMC-SCF3a is required*).

The statement of the Bidder's SLCC shall be supported by:

- a. Notice of Award and/or Notice to Proceed, Project Owner's Certificate of Final Acceptance issued by the Owner other than the Contractor or the Constructors Performance Evaluation System (CPES) Final Rating, which must be at least satisfactory. In case of contracts with the private sector, an equivalent document shall be submitted
  - b. Must submit Certificate of Satisfactory Completion issued by PCMC if done business with us at any one time.
6. Valid Philippine Contractor's Accreditation Board (PCAB) License and registration:

- License Category B, Medium A General Building

*In case of Joint Venture a Special PCAB License - License Category B, Medium A General Building*

7. The prospective bidder's **CY 2018** Audited Financial Statements, showing, among others, the prospective bidder's total current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of submission.

The Audited Financial Statement **shall be complete** which includes the following:

- a) Balance Sheet or Statement of Financial Position;
- b) Income Statement or Statement of Comprehensive Income;
- c) Statement of Changes of Equity;
- d) Cash Flow Statement and
- e) Notes to Financial Statement

8. The prospective bidder's computation of the Net Financial Contracting Capacity (NFCC) that must be at least equal to the ABC to be bid (*Use of Form No. DOBA-PCMC-NFF4 is required*);

**Class "B" Documents**

9. *In case of Joint Venture Agreement (JVA) the JV bidders shall submit a JVA in accordance with R.A. 4566 and its IRR, Section*

38.

Each partner of the joint venture shall submit their respective PhilGEPS Certificates of Registration in accordance with Section 8.5.2 of this IRR. The submission of technical and financial eligibility documents by any of the joint venture partners constitutes compliance: Provided, That the partner responsible to submit the NFCC shall likewise submit the Statement of all of its ongoing contracts and Audited Financial Statements.(a)

**(b) Technical Documents**

1. Bid Security (as *provided for on BDS Clause 18.1*)
2. Company Profile of Contractor and joint venture companies. Company printed brochure may be included.
3. Contractor's Organizational Chart for the contract to be bid (*Use of the Form No. DOBA-PCMC-SQF24 as the guide*)
4. List of Contractor's personnel and joint venture contractor's personnel to be assigned to the contract to be bid with supporting documents.

Project Engineer Construction Safety Officer Master Plumber / Sanitary Engineer Electrical Engineer Mechanical Engineer
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Supporting documents shall be the following:

- a. Statement of the Qualifications of the Key Personnel Proposed to be assigned to the contract (*use of the Form No. DOBA-PCMC-SQF17 is required*)
  - b. Contractor's letter - Certificate to the Procuring Entity (*use of the Form No. DOBA-PCMC-CCF23 is required*)
  - c. Key Personnel's Certificate of Employment *use of the Form No. (DOBA-PCMC-KCF18 is required)*
  - d. Bio-Data of each of the key personnel (*use of the Form No. DOBA-PCMC-BPF16 is required*)
5. Affidavit of Site Inspection (*use of Form no. DOBA-PCMC-SIF22 is required*).
  6. Signed *conforme* on Architectural, Electrical, Sanitary/Plumbing and Mechanical Plans Site Plan issued by PCMC.
  7. List of equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project(*use of Form No. DOBA-PCMC-LEF20 is required*).
  8. Manpower Utilization Schedule (*use of Form No. DOBA-PCMC-MUF13 is required*).
  9. Construction Schedule through Gantt Chart (for construction activities) and S-Curve (for financial requirements)
  10. Equipment Utilization Schedule (*use of Form No. DOBA-PCMC-EUF21 is required*).
  11. Construction Safety and Health Program  
**Note: Must be in accordance with the rules and regulations and other orders and issuances by the DOLE**



	12. PERT - CPM 13. Omnibus Sworn Statement ( <i>Use of the Form provided is required</i> )						
12.1 (a) (iii)	No further instructions.						
12.1(b)(ii.2)	The minimum work experience requirements for key personnel ( <i>refer to Terms of Reference</i> )						
12.1(b)(ii.3)	The minimum major equipment requirements are the following: <table border="1"> <thead> <tr> <th><u>Equipment</u></th> <th><u>Capacity</u></th> <th><u>Number of Units</u></th> </tr> </thead> <tbody> <tr> <td>i. Dump Truck</td> <td>5cu.m</td> <td>1</td> </tr> </tbody> </table>	<u>Equipment</u>	<u>Capacity</u>	<u>Number of Units</u>	i. Dump Truck	5cu.m	1
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13.1(b)	<p>The <b><u>FINANCIAL COMPONENT (ARRANGED, NUMBERED AND TABBED)</u></b> [<i>Strictly NO using of staple wire and thick materials for tabs</i>] of the bid shall contain the following:</p> <p><i>Use of indelible ink color blue shall be used by the authorized signatory in signing the required forms.</i></p> <ol style="list-style-type: none"> <li>1. Duly Accomplished and Signed Bid Form.</li> <li>2. Bid prices in Section VIII. Bill of Quantities in the prescribed Bid Form and should be supported by signed detailed estimates including a summary sheet indicating the unit prices of construction materials, labor rates and equipment rentals used in coming up with the Bid.</li> <li>3. Cash Flow by period (depending on the duration of the project) and payments schedule (<i>use of Form No. DOBA-PCMC-CFF27 as the guide</i>)</li> <li>4. Duly accomplished Certificate of Undertaking</li> <li>5. Signed <i>Conforme</i> on Section III. Bid Data Sheet on all pages</li> <li>6. Signed <i>Conforme</i> on Section V. Special Conditions of the Contract on all pages</li> <li>7. Signed <i>Conforme</i> on Section VI. Specifications on all pages</li> <li>8. One (1) CD-RW containing the exact copy of the accomplished forms under no. 2 requirement (Section VIII. Bill of Quantities and detailed estimates). The contents of the CD should be exactly the same as the hard copy of the forms submitted.</li> </ol> <p>Note: Any discrepancies between the submitted hard copy and soft copy of the Bill of Quantities and Detailed Estimates, the hard copy will prevail.</p>						
13.2	<p>The ABC is <b><u>Thirteen Million Four Hundred Sixty Thousand Two Hundred Sixty-Four Pesos (Php13,460,264.00)</u></b></p> <p>Any bid with a financial component exceeding this amount shall not be accepted.</p>						
14.2	“No further instructions.”						
15.2	The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Bids not addressing or providing all of the required items in the Bidding Documents including, where applicable, Bill of Quantities, shall be considered non-responsive and, thus, automatically disqualified. In this regard, where a required item is provided, but no price is indicated, the same shall be considered as non-responsive, but specifying a zero (0) or a dash (-) for the said item would mean that it is being offered for free to the Government, except those required by law or regulations to be provided for.						
16.1	The bid prices shall be quoted in Philippine Pesos.						

16.3	No further instruction														
17.1	Bids will be valid until <b><i>One Hundred Twenty (120) calendar days</i></b> from the submission and opening of bids														
18.1	<p>The bid security shall be in any of the following forms and amounts:</p> <ol style="list-style-type: none"> <li>1. Bid Securing Declaration [<i>use of Form No. DOBA-PCMC-BDF5 is required</i>]</li> <li>2. The amount of not less than <b><u>Php269,205.28 (2% of the ABC)</u></b> if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank; or</li> <li>3. The amount of not less than <b><u>Php4,038,079.20 (5% of the ABC)</u></b>, if bid security is in the form of Surety Bond callable upon demand issued by a surety or insurance company duly certified by Insurance Commission as authorized to issue such security.</li> </ol>														
18.2	The bid security shall be valid until <b><i>One Hundred Twenty (120) calendar days from opening of bids.</i></b>														
20.3	<p><b>Use of indelible ink <u>color blue</u> shall be used by the authorized signatory in signing the required forms.</b></p> <p>The <b>First (1<sup>st</sup>) Envelope</b>, shall contain the following:</p> <ul style="list-style-type: none"> <li>➤ <b><u>Eligibility Components</u></b> accomplished in five (5) sets, <b>each set filed in brown data binder</b></li> </ul> <p>Note : Separate folder for each partner in Joint-Venture Agreement.</p> <ul style="list-style-type: none"> <li>➤ <b><u>Technical Components</u></b> accomplished in five (5) sets, <b>each set filed in a brown data binder</b></li> </ul> <p>The <b>Second (2<sup>nd</sup>) Envelope</b> shall contain the <u>Financial Component</u> accomplished in five (5) sets, <b>each set filed in a brown data binder</b></p> <p><b>All copies should be certified as true copy</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><b>COLOR CODING OF FOLDERS/ENVELOPES</b></td> <td style="text-align: center;"><b>BROWN</b></td> </tr> </table> <p><b>LABEL ON THE ENVELOPE/S: IDENTIFY THE ENVELOPES:</b></p> <table style="width: 100%;"> <tr> <td>Name of PROCURING ENTITY</td> <td>as:&gt; Eligibility/Technical Requirements</td> </tr> <tr> <td>Name of CONTRACT TO BE BID</td> <td>(original, copy 1, 2, 3 &amp; 4)</td> </tr> <tr> <td>IB Number</td> <td>&gt; Financial Component Requirement</td> </tr> <tr> <td>DATE of Bid Opening</td> <td>original, copy 1, 2, 3, &amp; 4)</td> </tr> <tr> <td>Name of the Bidder Company</td> <td></td> </tr> <tr> <td>Address of the Bidder Company</td> <td></td> </tr> </table>	<b>COLOR CODING OF FOLDERS/ENVELOPES</b>	<b>BROWN</b>	Name of PROCURING ENTITY	as:> Eligibility/Technical Requirements	Name of CONTRACT TO BE BID	(original, copy 1, 2, 3 & 4)	IB Number	> Financial Component Requirement	DATE of Bid Opening	original, copy 1, 2, 3, & 4)	Name of the Bidder Company		Address of the Bidder Company	
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Name of the Bidder Company															
Address of the Bidder Company															
21	<p>The address for submission of bids is</p> <p><b><i>Executive Director's Office 2<sup>nd</sup> Floor, Philippine Children's Medical Center Quezon Avenue corner Agham Road, Quezon City</i></b></p> <p>The deadline for submission of bids is : <b><i>Refer to Invitation to Bid/ Bid Bulletin</i></b></p>														

24.1	The place of bid opening: <b><i>Refer to Invitation to Bid/ Bid Bulletin</i></b> The date and time of bid opening: <b><i>Refer to Invitation to Bid/ Bid Bulletin</i></b>
24.2	No further instructions.
24.3	No further instructions.
27.3	Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.
27.4	No further instructions.
28.2	<p>The <b><u>Lowest Calculated Bidder</u></b> and <b><u>In case of a Joint Venture Agreement, each of its partner</u></b> shall submit the following documentary requirements within a non-extendible period of <b>five (5) calendar days</b> from receipt of the notification that contain the following:</p> <ol style="list-style-type: none"> <li>1. CY 2018 Income Tax Returns filed and taxes paid through the BIR Electronic Filing and Payment System (EFPS)</li> <li>2. Valid and current Certificate of PhilGEPS Registration</li> <li>3. Latest Income and Business Tax Returns filed and paid through the BIR Electronic Filing (EFPS).</li> <li>4. Articles of Incorporation and General Information Sheet (GIS), in case the bidder has submitted a SEC registration as part of Eligibility Documents</li> </ol> <p>Failure of the Bidder declared as LCB to duly submit the requirements stated above or a finding against the veracity of such shall be ground for forfeiture of the bid security and disqualify the Bidder for award.</p>

31.4(f)	<p><i>List additional contract documents relevant to the Project that may be required by existing laws and/or the Procuring Entity, such as construction schedule and S-curve, manpower schedule, construction methods, equipment utilization schedule, construction safety and health program approved by the Department of Labor and Employment, and PERT/CPM or other acceptable tools of project scheduling.</i></p> <p><i>Additional contract documents:</i></p> <ul style="list-style-type: none"> <li>• <i>Health program approved by the Department of Labor and Employment</i></li> </ul>
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32.2

The Performance Security shall be accepted in any of the following forms:

FORM OF PERFORMANCE SECURITY	AMOUNT OF PERFORMANCE SECURITY (Equal to Percentage of the Total Contract Price)
a) Cash or cashier's/ manager's check issued by a Universal or Commercial Bank	Ten percent (10%)
b) Bank draft/guarantee or irrevocable letter of credit issued by a Universal or Commercial Bank: Provided, however, that it shall be confirmed or authenticated by a Universal or Commercial Bank, if issued by a foreign bank	
c) Surety bond callable upon demand issued by a surety or insurance company duly certified by the Insurance Commission as authorized to issue such security.	Thirty percent (30%)

**Contract Agreement** for this purpose shall be submitted within ten (10) calendar days from receipt of NOA.

**NOTE: The Lowest Calculated and Responsive Bidder will be required to submit five (5) copies of Instructions to Bidders (ITB) and General Conditions of the Contract (GCC) with signed *conforme* on all pages**

**CONFORME:**

\_\_\_\_\_  
Authorized Signatory  
Signature over printed name

\_\_\_\_\_  
Name of Company/Firm



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## **SECTION V**

### ***Special Conditions of Contract***

# **One (1) Lot Supply of Labor, Materials, Equipment and Furniture in the Construction of Doctor's Private Clinic Extension**

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**IB No. 2019-152**



## Special Conditions of Contract

GCC Clause	
1.17	The Intended Completion Date is within <b>Ninety (90) Calendar Days</b>  <i>NOTE: The contract duration shall be reckoned from the start date and not from contract effectivity date.</i>
1.22	The Procuring Entity is  <b>PHILIPPINE CHILDREN'S MEDICAL CENTER Quezon Avenue, corner Agham Road, Quezon City</b>
1.23	The Procuring Entity's Representative  <b>JULIUS A. LECCIONES, M.D., MHSA, MPM, CESO III Executive Director</b>
1.24	The Site is located at  <b>Quezon Avenue, cor. Agham Road, Quezon City</b>
1.28	The <b>Start Date</b> is <b>Seven (7) Calendar days upon receipt of Notice to Proceed (NTP)</b>  <i>NOTE: The start date shall be the date of receipt of the Notice to Proceed.</i>
1.31	The Works consist <b>One (1) lot Supply of Labor, Materials, Equipment &amp; Furniture in the Construction of Doctor's Private Clinic Extension</b>
2.2	There is no sectional completion.  The project will be completed within <b>Ninety (90) Calendar days</b>
5.1	The <b>Procuring Entity</b> shall give possession of all parts of the Site to the Contractor on the actual start date.
6.5	The Contractor shall employ the following <b>Key Personnel</b> :  (1) Project Engineer (1) Construction Safety Officer (1) Master Plumber / Sanitary Engineer (1) Electrical Engineer (1) Mechanical Engineer
7.4 (c )	Submission of As Built Plans- Four (4) copies
7.7	No Further instructions.
8.1	Subcontracting is allowed for installation of Air-conditioning System.
10	None
12.3	No further instructions.
12.5	<b>In case of semi-permanent structures, such as buildings of types 1, 2, and 3 as classified under the National Building Code of the Philippines, concrete/asphalt roads, concrete river control, drainage, irrigation lined canals, river landing, deep wells, rock causeway, pedestrian overpass, and other similar semi-permanent structures: Five (5) years.</b>
13	<b>"Partners to the joint venture shall be jointly and severally liable to the Procuring Entity."</b>
18.3 (h)(i)	No further instructions.

21.2	The Arbiter is <i>(to be agreed upon by both parties):</i>
29.1	Day works are applicable at the rate shown in the Contractor's original Bid.
31.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within <i>14</i> days of delivery of the Notice of Proceed.
31.3	The period between Program of Work updates is seven (7) days/ weekly.  The amount to be withheld for late submission of an updated Program of Work is <b><i>Two percent (2%)</i></b> of progress billing.
34.3	The Funding Source is the <i>Government of the Philippines</i> .
39.1	The amount of the advance payment is <b><i>not to exceed Fifteen Percent (15%)</i></b> of the total contract price to be made in lump sum.  Payment will be made subject to receipt of fund from DBM and DOH.
40.1	Materials and equipment delivered on the site but not completely put in place shall <b><u>NOT</u></b> be included for payment.
40.4	The first progress payment may be paid by the Procuring Entity to the Contractor provided that at least twenty percent (20%) of the work has been accomplished as certified by the Procuring Entity's Representative
51.1	The date by which operating and maintenance manuals are required is <i>Five (5) days</i> after the date of completion.  The date by which "as built" drawings are required is <i>Five (5) days</i> after the date of completion
51.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals is <b><i>Two Percent (2%)</i></b> of the total contract price.

**CONFORME:**

\_\_\_\_\_  
Authorized Signatory  
Signature over printed name

\_\_\_\_\_  
Name of Company/Firm



**Republic of the Philippines**  
**PHILIPPINE CHILDREN'S MEDICAL CENTER**  
**Bids and Awards Committee**

Quezon Avenue, Quezon City 1100  
588-9900 loc 361 Website: [www.pcmc.gov.ph](http://www.pcmc.gov.ph) email: bac@pcmc.gov.ph

## **SECTION VI**

### ***Specifications***

# **One (1) Lot Supply of Labor, Materials, Equipment and Furniture in the Construction of Doctor's Private Clinic Extension**

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**IB No. 2019-152**

# TERMS OF REFERENCE

## TERMS OF REFERENCE

### I. PROJECT BACKGROUND

Description of the Project: Supply of labor, materials, equipment & furniture in the **CONSTRUCTION OF DOCTORS PRIVATE CLINIC EXTENSION**

Location: PCMC 2<sup>ND</sup> Floor (formerly Post Partum)

Duration: 90 calendar days

### II. PURPOSE/OBJECTIVE OF THE PROJECT

- a. To upgrade the facilities to modern standard with emphasis in safety.
- b. To provide good service by giving the patients of PCMC suitable and comfortable clinics.

### III. PROJECT COMPONENTS

The Project calls for the **CONSTRUCTION OF DOCTORS' PRIVATE CLINIC EXTENSION.**

- a. All Civil works.
- b. All Architectural Works which includes but not limited to the following, finishes inclusive of Floors, Walls which includes repainting of interior and exterior, Wall Protection, Ceilings, Doors, Windows rehabilitation interior and exterior, Toilets and other specialty trades.
- c. All Electrical Works
- d. All Mechanical Works which includes but not limited to the following, Inverter Type Air-conditioning and Fire Protection Pipes and Sprinkler Heads compatible to the existing system and fire extinguishers.
- e. All Sanitary and plumbing works
- f. All Electronic and Communication works which includes but not limited to Fire Detection and Alarm System compatible to the existing system, Telephone lines, etc.
- g. Furniture which includes the following Doctor's table and chair, foot basin, Secretary table and chair, waiting area and lobby chairs and modular cabinets similar to the specifications and number of the existing Doctor's Clinic.

PCMC shall approve all materials, colors and equipment needed for the construction of the Doctor's Private Clinic Extension. Building Design shall conform with the provisions of the National Building Code of the Philippines (PD 1096), Code on Sanitation of the Philippines, Accessibility Law (BP 344),



National Structural Code of the Philippines, Electrical Engineering Law (RA 7920), Mechanical Engineering Law (RA 5336), Plumbing Code (RA 1378, 1993-1994 Revisions), Fire Code (RA 9514) and other laws and regulations covering environmental concerns and local ordinances and regulations. Page 4 of 162

#### **IV. IMPLEMENTATION ARRANGEMENT**

Reporting Protocol

- a. PCMC Infrastructure Committee

#### **V. ELIGIBILITY REQUIREMENTS:**

##### **A. Basic**

- a. The eligibility requirements shall comply with all provisions of Sections 23 of IRR of RA 9184.
- b. A modified set of requirements integrating eligibility documents and criteria for infrastructure projects shall be adopted in accordance with Annex "E" CONTRACT IMPLEMENTATION GUIDELINES FOR THE PROCUREMENT OF INFRASTRUCTURE PROJECTS from Revised IRR of R.A. 9184
- c. The Contractor must have completed a similar project general building in the amount of at least fifty percent (50%) of the ABC within the last 5 years.
- d. Must have Certificate of Completion and Good Performance based on the Contractor's Performance Evaluation System or CPES.
  1. Copy of end-user's acceptance or official receipt(s) or certificate of completion issued for the contract. If a government contract, copy of the Constructors Performance Evaluation Summary (CPES) Final Rating which must be at least satisfactory.
  2. Required PCAB License Category B, Medium A General Building.

##### **B. Key Personnel for the Construction of the Project**

The Contractor shall provide the following key personnel during the construction phase, the Bidder must assign to the project professionals as shown below:

- 1.1. Project Engineer (1)
  - i. Licensed Engineer
  - ii. At least 5 years and above of experience in construction
  - iii. Good oral and written communication skills
- 1.2 Construction Safety Officer (1)
  - i. Licensed Engineer
  - ii. At least 5 years and above of experience in construction
  - ii. DOLE accredited/trained

- 1.3 Electrical Engineer (1)
  - i. Licensed Electrical Engineer
  - ii. At least 5 years and above of experience in construction
- 1.4 Master Plumber/ Sanitary Engineer (1)
  - i. Licensed Electrical Engineer
  - ii. At least 5 years and above of experience in construction
- 1.5 Mechanical Engineer (1)
  - i. Licensed Electrical Engineer
  - ii. At least 5 years and above of experience in construction

## **VI. APPROVED BUDGET COST**

The total approved budget cost for the Project is Thirteen Million Four Hundred Sixty Thousand Two Hundred Sixty-Four Pesos (Php 13,460,264.00).

## **VII. TIME FRAME**

The Contractor is required to complete the Project within 90 calendar days (Please see annex A), to start within 7 calendar days upon the Contractor's receipt and signing of Notice to Proceed.

## **VIII. OBLIGATION OF THE CONTRACTOR**

1. To comply with the requirement as set forth in the PCMC bidding documents as provided for on RA 9184 and its IRR and other applicable rules and regulations related to the project.
2. To conduct site inspection before participating the bidding to consider all conditions that may directly or indirectly affect the implementation of the project, including verification of measurement/dimensions of the plans/drawings.
3. To provide and guarantee the highest quality of workmanship. All works must comply with the standard, approved plans, scope of works and technical specifications provided for by PCMC. Non-complied or non-acceptable works must be corrected without cost to PCMC.
4. Provide the following on his own accounts/expense;
  - a. All necessary permits and other documents required ahead of time before commencement of work.
  - b. Suitable Staging, temporary office at specified location inside the PCMC grounds for his workmen.
  - c. Suitable and approved fences/barricades/signage's around the project working area to safeguard his workmen and the public against accidents.

- d. Proper PPE, uniform and first aid kits for its workmen while inside PCMC premises.
  - e. Record and logbook for daily attendance of its workmen and activities.
5. To provide licensed engineer that will constantly coordinate with PCMC authorized representative to decide on normal and critical condition during the construction phase. There should be a weekly meeting (or more often when necessary) for both parties to discuss the progress and other matters related to the project.
  6. To seek approval, at all times, from PCMC Representative regarding tapping of electrical works like main line. All FDAS installation must conform to the existing system.
  7. To ensure that all retrofitted structural members will not be damaged during the construction, otherwise the contractor will shoulder the repair of the said structural members.
  8. To submit complete sets of as-built plan, requirement for the release of final payment.
  9. To submit detailed shop drawings, detailed estimate and adjusted work schedule in any additional works, change order/variation order. Shop drawing shall be signed and sealed. Implementation shall be subject to verification and recommendation of Engineering Section and shall be approved by the PCMC authorized representative.
  10. To comply with PCMC's standard operating procedures, policies and regulations, such as but not limited to:
    - a. All deliveries of materials must pass through PCMC Materials Management Division-Receiving Area, duly supported by a delivery receipt/sales invoice. PCMC Engineering shall check conformity of specifications before acceptance.
    - b. All tools and equipment to be brought-in must pass through PCMC Security Office for issuance of entry pass. Pull out of tools and equipment must be with corresponding gate pass issued by the Materials Management Division.
    - c. Tools and materials must be delivered 100% to finish the project as per plans and specifications. All excess scrap materials will become property of PCMC.
    - d. Safekeeping and safeguarding of tools, equipment and materials shall be the accountability of the Contractor.
    - e. Avoid any act/s that will cause disruption of hospital operation. The contractor shall be held liable for all damages incurred

during construction. Restoration of damages shall at their own expense. Page 7 of 162

- f. Entry and exit of workmen is subject for inspection by PCMC guard.
- g. Secure work permit at engineering section before commencement of work.
- h. Policies and regulations reflected on approved work permit shall be complied at all time.

**IX. MINIMUM REQUIREMENT FOR CONSTRUCTION SAFETY AND HEALTH PROGRAM**

Every construction project shall have a suitable Construction and Safety Program, which must be in accordance with the rules, and other orders and issuances issued by the DOLE, the Project In-Charge, or an equally responsible officer, shall be responsible for the compliance of the Program.

- a. Contractor shall assign/deploy an accredited Safety Officer during construction.
- b. Contractor shall have health insurance for all its personnel and workmen.
- c. Contractor has the sole responsibility for the safety of its workmen. PCMC holds no liability for any injuries, loss of life during construction.

# *Technical Specifications*

# **GENERAL REQUIREMENTS**



**01010 : SUMMARY OF MATERIALS AND FINISHES**

**1.00 GENERAL REQUIREMENTS**

1.01 RELATED SECTIONS

All applicable provisions of the different divisions of the Specifications for each work trade shall apply for all items cited in this Summary.

1.02 INFERRED ITEMS OF WORK

Materials and workmanship deemed necessary to complete the works but NOT specifically mentioned in the Specifications, Working Drawings, or in the other Contract Documents, shall be supplied and installed by the Contractor without extra cost to the Owner. Such materials shall be of the highest quality available, and installed in a workmanlike manner at prescribed or appropriate locations.

1.03 SPECIFICS

Materials specifically mentioned in this Summary shall be installed following efficient and sound engineering and construction practice, and especially as per manufacturer's application for installation specifications that shall govern all works alluded to in these Specifications.

**2.00 MASONRY**

4.01 Concrete Hollow Blocks (CHB)

A. References:

- Conforming to Philippine National Standard (PNS) 16, Type I, Class A,
- Minimum compressive strength of 4.82 MPA (700 psi) for all building walls, perimeter fence/walls and trenches

B. Sizes:

1. 200mm (8")
2. 150mm (6")
3. 100mm (4") thick CHB, machine-vibrated with even texture and well-defined edges

C. Application:

1. 100mm (4") thick CHB for interior walls of the PCMC Clinic extension as specified on plans,

2.02 Reinforcing Bars and Tie Wires:

A. References

1. Conforming to Reinforcing Steel Bar ASTM A 615; or PNS 49; 40,000 psi

2. ASTM A 155.

B. Sizes

1. 10mm diameter
2. 12mm diameter
3. 16mm diameter
4. 20mm diameter
5. 25mm diameter and tie wire.

2.03 Mortar and Plaster Works: With mixture as required. See 3.00 C1, C2B, C3, C4, C5 and C6.

- A. Use ADHESIVE MORTAR for laying vitrified ceramic tiles with ABC DISPERSION COMPOUND as an additive to ADHESIVE MORTAR.
- B. Use GROUT pre-mixed dry well filler for floor and wall tile joints either glazed or unglazed tiles.
- C. For Toilet, floor and walls:

**3.00 DOORS AND WINDOWS**

3.01 DOORS

Provide and install doors with complete locksets, hinges and accessories as per plans.

- |        |  |
|--------|--|
| Type 1 | Hollow Core Flush Type Door with Laminated surface with viewing glass Panel (Single leafed Swing)                  |
| Type 2 | Hollow Core Flush Type Door with Laminated surface (Single leafed Swing)   |
| Type 4 | Aluminum Sliding Door  |
| Type 3 | Hallow Core Flush Type Door with Laminated Surface on outside and marine plywood inside face (Single leafed Swing) |

3.02 WINDOWS

Windows shall be moss green shade with powder-coated aluminum sections of jambs, heads, tubing

3.03 GLASS

As manufactured by.

- A. Sliding Windows 6mm (1/4")- others Details as indicated in the Drawings.
  - Aluminum Casement
  - Tempered Clear glass on Aluminum Frames for windows.

3.04 GLAZING

- A. Bulk Compound for glass installations:

1. Mastics - Elastic compound and non-skinning compound.
2. Putties - Wood sash putty, metal sash putty.
3. Sealants - one component, two components

B. Preformed Sealants:

1. Synthetic polymer-based sealants - resilient or non-resilient type.
2. Preformed gaskets - compression type, structural type.

**DIVISION 1 : GENERAL REQUIREMENTS**

**01300 : SUBMITTALS**

ITEMS FOR SUBMISSION BY THE CONTRACTOR FOR THE ARCHITECT'S APPROVAL PRIOR TO ORDER, PURCHASE, WORK OR MANUFACTURE:

1.00 SAMPLES

1.1	All finishing hardware: locksets, deadbolts, hinges, bull boards, sliding mechanism, door closers, door bumpers & drawer pulls, barrel/foot bolts and padlocks . . . . .	1 set each
1.2	All paints, . . . . .	30cm x 30cm mat'l swatches, all colors
1.3	Dry Wall partition and Ceiling Board . . . . .	30cm x 30cm mat'l
1.4	Aluminum windows and others	10cm length (1 sets)
1.5	Aluminum sections for all framing of windows and others . .	10cm length (1sets)
1.6	All toilet accessories . . . . .	1 set each
1.7	Floor drains . . . . .	1 set each
1.8	All plumbing fixtures / fittings . . . . .	1 set each
1.9	All metal pipes, PVC pipes & fittings including (Phil. Bureau of Standards) certificates for other than those specified . . .	20cm length
1.10	Exhaust fans . . . . .	1 set each
1.11	Fire alarm system components and accessories . . . . .	1 set
1.12	Panel board and circuit breaker . . . . .	1 set
1.13	All lighting fixtures and accessories . . . . .	1 set each
1.14	All wiring devices, junction box, pull box and access .	1 set of each type

- |      |   |                        |
|------|---|------------------------|
| 1.15 | All conduits, fittings, wires, cables and accessories . | 1m length of each type |
| 1.16 | Sample using Laminates Counters and Doors . . . . .     | 30cm x 30cm material   |
- 2.00 TECHNICAL CATALOGUES AND BROCHURES
- 2.01 Fire Alarm system
  - 2.02 All plumbing fixtures and accessories
  - 2.03 Fire extinguisher
  - 2.04 Telephone Pull Box
  - 2.05 Lighting fixtures
  - 2.06 Conduit, fittings and boxes
  - 2.07 Wires and cables
- 3.00 DETAILED SHOP DRAWINGS
- 3.01 All aluminum windows indicating the code of the aluminum section as per manufacturer's specifications.
- 4.00 LABORATORY TEST CERTIFICATE
- 4.02 Concrete hollow blocks
- 5.00 GUARANTEES / WARRANTIES
- 5.03 Slip type and Air-condition units
  - 5.05 Fire alarm system
  - 5.06 Sound system
  - 5.07 Fans

**01340 : SHOP DRAWINGS****1.00 DETAILED DRAWINGS AND INSTRUCTIONS****1.01 Supplementary Drawings and Instructions**

The drawings referred to in these Specifications maybe further supplemented by additional detail drawings and instruction essential to the proper interpretation of the Drawings and the proper execution of work. The Architect shall furnish with reasonable promptness such additional details Drawings and Instruction. All such additional detail drawings and instruction shall be consistent with the Contract Documents, true development thereof, and reasonable inferable therefrom. All such additional drawings and instruction are to be considered of equal importance as those, which originally accompany the specifications.

The work shall be executed in conformity with such detail drawings and instructions, and the Contractor shall do no work without proper drawings and instructions.

**1.02 Schedule for Submission of Detail and Shop Drawings**

The Contractor and the Architect, if either one so request, shall jointly prepare a schedule subject to change from time in accordance with the progress of the work, fixing the dates at which the various details drawings will be required and the Architect shall furnish them in accordance with the schedule. Under like conditions, a schedule shall be prepared, fixing the dates for submission of the shop drawings, for the beginning of manufacture and installation of materials and for the completion of the various parts of the works.

**2.00 SHOP DRAWINGS****2.01 Conditions in the Preparation of Shop Drawings**

The Contractor shall prepare at his own expense and submit with such promptness as to cause no delay in his own work or in that of any other contractor doing work on the same building, two copies of all shop or setting drawings, templates, patterns and models, as well as schedule required for the work of various trades, and the Architect shall pass upon them with reasonable promptness, making desired corrections.

The Contractor shall make any corrections required by the Architect, file with him two corrected copies and furnish such other copies as may be needed.

**2.02 Checking Drawings of Sub-Contractors**

Before submitting shop drawings for approval, the Contractor shall check drawings of all sub-contractors for accuracy. He shall see that all work contiguous with and having bearing on work indicated on shop drawings is



Shop drawings shall be numbered consecutively and represent:

- A. All working and erection dimensions
- B. Arrangements and sectional views.
- C. Necessary details including complete information for making connections with other work
- D. Kinds of materials and finishes

Shop drawings shall be dated and shall contain:

- A. Name of project;
- B. Descriptive names of equipment, materials and classified item numbers;
- C. Location at which materials or equipment are to be installed in work.

#### 2.04 Letter of Transmittal

Submission of Shop Drawings shall be accompanied by a Letter of Transmittal in duplicate, containing: name of project, Contractor's name, number of drawings, titles and other pertinent data.

#### 2.05 Corrections, Changes and Variations

The Contractor shall submit three sets of shop drawings to the Architect for approval. Satisfactory shop drawings will be so identified by the Architect, dated, and one copy thereof returned to the Contractor should shop drawings be disapproved by the Architect, one set of such drawings will be returned to the Contractor with necessary corrections and changes to be made as indicated.

- A. The Contractor shall make required corrections and changes and re-submit shop drawings in duplicate until the Architect's approval is obtained
- B. Upon receipt of approval, the Contractor shall insert the date of approval on tracings and promptly furnish the Architect with three additional prints of approved drawings
- C. No work called for by shop drawings shall be executed until the Architect's approval is given.

If shop drawings show variations from Contract requirements because of standard shop practice or other reasons, the Contractor shall make mention of such variation in his letter of submittal

#### 2.06 Responsibility for Accuracy

Approval of shop drawings will be general. It shall not relieve the Contractor of responsibility for accuracy of such drawings, nor for proper fitting and construction of work, nor for furnishing of materials or work required by the Contractor and not indicated on shop drawings. The Architect's approval of such drawings or schedule shall not relieve the Contractor from responsibility for deviations from Drawings or Specifications, unless he has in writing, called the Architect's attention to such deviations at the time of submission and secure

his written approval, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules.



The Contractor is put on notice that if he proceeds with the Work without securing the approved Shop/Placement and/or Fabrication Drawings from the Contract Consultant and the Area Office, any and all expenses incurred by inadequate or incorrect fabrication or installation, including time delays, will be borne exclusively by the Contractor and his sub-contractor/suppliers. The Owner and his representatives will be absolved of any liability or prior approvals.

**DIVISION 1 : GENERAL REQUIREMENTS****01500 : CONSTRUCTION FACILITIES****1.00 USE OF PREMISES****1.01 Limitations for Use**

The Contractor shall confine his apparatus, storage of materials and operations of his workmen to limits indicated by the law, ordinances, permits or directions of the Architect and shall not unreasonably encumber the premises with his materials.

**1.02 Safeguard for Structure**

The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety. The Contractor shall enforce the Architect's instructions regarding signs, advertisements, fires and smoking.

**2.00 TEMPORARY STRUCTURES AND FACILITIES****2.01 Temporary Office and Contractor's Building**

The Contractor shall at all times provide and maintain adequate weathertight temporary offices with water, light, telephone and toilet facilities for the use of the Architect, resident engineers, inspectors, contractors and sub-contractors. The office shall be provided with wooden floors raised above the ground, windows, doors and locks, tables, closet, blackboard, tackboard, benches and racks for drawings. Upon request, an enclosed private area shall be apportioned for the Architect's use.

**2.02 Temporary Housing for Workers**

The temporary buildings for housing men, or the erection of tents or other forms of protection, will be permitted only at such places as the Owner or Architect shall designate; and the sanitary conditions of the grounds in or about such structures shall at all times be maintained in a manner satisfactory to the Owner and the Architect. Nobody shall be allowed to sleep or cook within the building line of the project under construction.

**2.03 Temporary Sanitary Facilities and First Aid Station**

The Contractor shall provide, construct and maintain for the duration of the contract, ample sanitary toilet accommodation and other necessary conveniences including water connections for the use of personnel and laborers, properly secluded from public observation, in such manner and at such points as shall be approved by the Architect; and their use shall be strictly enforced. The Contractor shall keep all places clean and free from flies; removing all connections and appliances connected therewith prior to the completion of the contract, and leave the premises perfectly clean.

**2.04 Temporary Barricades and Guard Lights**

The Contractor shall furnish and put up all temporary barricades and guard lights necessary for the protection, proper execution and completion of work. Page 19 of 162  
The guard lights at the top of the falsework tower, barricades, railings, etc. shall be provided and maintained by the Contractor throughout the duration of the project.

#### 2.05 Temporary Water, Power and Telephone Facilities

The Contractor shall make all necessary arrangements with the local utility companies in order that temporary facilities for water, power and telephone are sufficiently provided until the completion of work. The Contractor shall pay all expenses incurred in connection therewith.

#### 2.06 Temporary Signs

No signs or advertisements will be allowed for display without the Architect's approval. The Contractor may erect one painted sign as approved by the Architect, giving names and addresses of the Architect, Contractor and various sub-contractors. The Architect shall approve the size, color, lettering and sign location.

#### 2.07 Temporary Roadways

The Contractor shall construct and properly maintain temporary roadways within and adjacent to the site in order to provide proper access to the building. Temporary roadways shall adequately sustain loads to be carried on them and be so constructed as not to endanger existing or newly installed underground structures.

#### 2.08 Temporary Stairs, Ladders, Ramps and Runways

The Contractor shall furnish and maintain all equipment such as temporary stairs, ladders, ramps, scaffolds, runways, derricks, chutes and the like, as required for proper execution of work by all trades. All such apparatus, equipment and construction shall meet all requirements of Labor Law and other local laws applicable thereto.

#### 2.09 Temporary Elevators and Hoists

The Contractor shall install and operate an adequate number of hoists and elevators. No hoists shall be constructed at such locations as will interfere with or affect construction of floor arches (or work of other contractors). They may be located at the exterior side of the structure and extend upward adjacent to the line of window openings. They shall be located at a sufficient distance from exterior walls and be so protected as to prevent damage, staining, or marring the permanent work.

#### 2.10 Temporary Enclosures

The Contractor shall provide temporary weathertight enclosures for all exterior openings as soon as walls and roof are built so as to protect all work from weather. All exterior doors shall be equipped with self-closing hardware and padlocks. All exterior windows shall be provided with temporary sash frames

#### 2.11 Temporary or Trial Usage

Temporary or trial usage by the Owner of any mechanical device, machinery, apparatus, equipment or any work or materials supplied under Contract before final completion and written acceptance by the Architect shall not be construed as evidence of Architect's acceptance of same.

The Owner shall have the privilege of such temporary or trial usage, for such reasonable length of time, as the Architect shall deem to be proper. No claim for damage shall be made by the Contractor for injury to, or breaking of any parts of such work, which may be caused by weakness or inaccuracy of structural parts or by defective material or workmanship. If the Contractor so elects, he may, at his expense, place persons satisfactory to the Architect to make such trial usage.

#### 2.12 Removal of Temporary Structures

The Contractor shall remove all temporary work from premises, erected by him and shall clean the premises as a condition for completing the work and before acceptance of work by the Owner.

### 3.00 PROTECTION OF WORK AND OWNER'S PROPERTY

#### 3.01 Safeguard Measures

The Contractor shall put up and continuously maintain adequate protection of all his work from damage and shall protect the Owner's property, as well as all materials furnished and delivered to him by the Owner. He shall make good any such damage, injury or loss, except such as may be caused by agents or employees of the Owner, or due to causes considered as an Act of God.

- A. The Contractor shall provide reliable and competent watchmen to guard the site and premises, from commencement of operations until building is fully operational. Provide all doorways with locks under control of the Contractor, who shall lock doors at the close of each day's work. In the event that the Architect at any time deems watchmen service inadequate or incompetent, the Contractor shall increase or change the watchmen personnel to the Architect's satisfaction.
- B. Smoking on the premises shall be prohibited except in areas designated by the Owner or the Architect. Fires shall not be built on the premises except by express consent of the Architect.
- C. The Contractor shall provide and maintain in good working order and adequate number of fire extinguishers.

#### 3.02 OLD MATERIALS

All old materials of value found by the Contractor upon the work area shall be carefully stored in an area designated by the Owner or the Architect; the Contractor shall be responsible for the same until final acceptance of the work. Page 21 of 162

### 3.03 TREES AND OTHER PLANTS

Existing trees, plants, shrubs, etc. which are to remain shall be boxed and otherwise protected from damage. No trees within the site or located outside building lines shall be cut or removed without specific approval from the Owner and the Architect.

### 3.04 DRAINAGE

If it is necessary in the prosecution of the work to interrupt or obstruct the natural flow of rivers or streams, the drainage of the surface, or the flow of artificial drains, the Contractor shall provide for the same during the progress of work in such a way that no damage shall result to either public or private interests. For any neglect to provide for other natural or artificial drainage which the Contractor may have interrupted, he shall solely be held liable for all damages, which may result therefrom during the progress of work.

## 4.00 PROTECTION OF ADJACENT PROPERTY AND EXISTING UTILITIES

### 4.01 CONTRACTOR'S SOLE RESPONSIBILITY

The Contractor shall adequately protect adjacent property as provided by law and the Contract Documents. The construction, building or work, in addition to any neighboring property or building which may be jeopardized in any manner, must be thoroughly and substantially braced against winds, floods, settling, falling, or like similar occurrences, and when necessary, covered and protected from sun and rain at the Contractor's expenses. The Contractor shall solely be liable and pay for all damages occasioned in any manner by his acts or neglect, or of his agents, employees, or workmen.

## 5.00 PROTECTION OF LIFE, WORK AND PROPERTY DURING AN EMERGENCY

In an emergency affecting the safety of life or of the work or of adjoining property, the Contractor, without special instruction or authorization from the Architect or Owner, is hereby permitted to act, at his discretion, to prevent such threatened loss of injury and he shall so act, without appeal, if so instructed or authorized. Any compensation claimed by the Contractor on amount of emergency work shall be determined by agreement or arbitration.

**01750 : CONTRACTOR'S INSURANCE AND BONDS****1.00 CONTRACTOR'S LIABILITY INSURANCE**

The Contractor shall secure and maintain such insurance from an insurance company approved by the Owner as will protect himself, his sub-contractor and the Owner from claims for bodily injury, death or property damage which may arise from operations under this Contract. The Contractor shall not commence work under this Contract until he has obtained all insurance required under this section and shall have filed the certificate of insurance or the certified copy of the insurance policy with the Owner. Such insurance policy shall contain a clause stating that the insurance company shall not revoke said policy without ten (10) days' written notice to the Owner of intention to cancel. The amounts of such insurance shall be as agreed upon.

**2.00 CONTRACTOR'S FIRE INSURANCE**

In addition to such Fire Insurance as the Contractor's elects to carry for his work protection, he shall secure and maintain in the name of the Owner policies upon such structures and materials and in such amount as shall be designated. These policies shall be secured from a company, which is satisfactory to the Owner and delivered to the Owner.

**3.00 CONTRACTOR'S PERFORMANCE AND PAYMENT BONDS**

The Contractor, prior to signing the Contract, shall furnish a Performance Bond equal to 30% of the Contract Amount for the faithful performance of his work and 30% Payment Bond covering payments and obligations arising from his Contract. Such bonds shall be in the form of sureties as approved by the Owner. Such bonds shall remain in effect until replaced by the Contractor's Guarantee Bond.

**4.00 CONTRACTOR'S GUARANTEE BOND**

The Performance and Payment Bonds will be released by the Owner after the expiration of two (2) months from the final acceptance of the work and only after the Contractor has furnished the Owner a Guarantee Bond in the amount of 20% of the Total Contract Cost. The Guarantee Bond shall be for a period of one (1) year commencing from the date of acceptance as a guarantee that all materials and workmanship installed under the Contract are of good quality.

**5.00 CONTRACTOR'S GUARANTEE - WARRANTY**

- A. The Contractor shall, in case of work performed by his sub-contractors and where guarantees are required, secure warranties from said sub-contractors and deliver copies of it to the Owner upon completion of work.
- B. The Contractor shall and thereby warrants all work performed by him directly and for which guarantee are required.
- C. The Contractor shall and thereby warrants and/or guarantees for a period of one year, or for longer periods where so provided in Specifications, as evidenced by date of final certificate issued by the Architect, all materials and workmanship installed under Contract to be of good quality in every respect and to remain so for periods described herein.

- D. Should any defects develop in aforesaid work, within the specified periods due to faults in material and/or workmanship, the Contractor thereby agrees to make all repairs and do all necessary work to correct defective work to the Architect's satisfaction. Such repairs and corrective works shall be done without cost to the Owner and at entire cost and expenses of the Contractor within five (5) days written notice to the Contractor by the Owner.
- E. In case the Contractor fails to do the work so ordered, the Owner may have the work done and charge the cost thereof against monies retained as provided for in the Agreement and, if said retained monies shall be insufficient to pay such cost, or if no money is available, the Contractor and his sureties agree to pay to the Owner the cost of such work.
- F. All the foregoing are without prejudice to the right of the Owner under the New Civil Code and other laws now or hereafter that may be applicable.

# *Technical Specifications*

# ARCHITECTURAL



**04060 : MASONRY MORTAR**

**PART 1 - GENERAL**

**1.1 SCOPE**

Furnish materials and equipment and perform labor required to complete plaster, masonry work and patching mortar as shown in the drawings and specified herewith.

**PART 2 - PRODUCTS**

**2.1 MASONRY MORTAR**

- a. Sand : ASTM C 35 - 67
- b. Portland Cement : ASTM C 150 or PNS 07; Type 1.
- c. Water: clean and free from deleterious substances.

**2.2 MIXES**

Cement mortar shall either be 1 part Portland cement 2 parts sand, but not more than 1 part Portland cement and 3 parts sand

**2.3 PLASTER BOND**

- a. Application
  - a.1 Apply at all wall areas prior to plastering.
- b. Approved Manufacturer:
  - a.1 \_\_\_\_\_ or approved equal

**PART 3 - EXECUTION**

**3.1 APPLICATIONS OF CEMENT PLASTER**

- a. Scratch Coat: Apply with sufficient force and materials to form full keys or bond. Cross scratch as soon as scratch coat has attained initial set and apply brown coat as soon as practicable.
- b. Brown Coat: Scratch or broom for bond of finish coat and allow setting hard. Keep brown coat moist until finish coat is applied.
- c. Finish Coat: Bring to true, even surfaces with rods, daries and trowel smooth, leaving finished surface free from tool marks and blemishes. Keeps cements plaster **moist for at least three days and protect against rapid evaporation until cured.**

### 3.2 APPLICATION OF MASONRY MORTAR:

Lay all concrete blocks with 9mm (3/8") thick horizontal and vertical mortar joints.

### 3.3 APPLICATION OF PATCHING MORTAR:

- a. Provide the same mixture of gray and white cement for patching mortar used to fill holes and imperfections, but should be a richer mixture and the cement and sand proportions should be the same as those used in the concrete.
- b. Never steel trowel patches, but finishes with wood or cork floats.
- c. Allowing the mixed patching mortar to stand for an hour or two before using it reduces the amount of shrinkage but never add water in remixing it.

## **PART 4 - MEASUREMENT AND RATES**

### 4.1 GENERAL

The quantity shall be computed from the drawings and measurement and payment shall only be against the pay items contained in the Bill of Quantities.

The rates shall be full compensation for all plant, materials, labor, equipment, transport, temporary works, establishment charges, overhead and profit required to complete the work described in this Specification.

**08520 : ALUMINUM WINDOWS**

***PART 1- GENERAL***

**1.1 SCOPE**

Furnish materials and equipment and perform labor required to complete aluminum interior-framed windows; sliding windows.

See drawings and schedules for sizes, details and location of required work.

**1.2 SHOP DRAWINGS AND SAMPLES**

- a. Submit shop drawings and secure Consultant's approval.
- b. Submit sample corner sections, hinges, tracks, handles and all other accessories.

***PART 2 - PRODUCTS***

**2.1 ALUMINUM WINDOWS**

**2.1.1 Materials**

- a. Aluminum interior-framed windows sliding windows: fixed hardware mounted on aluminum jambs. Provide neat fixation to one another using concealed hardware connectors and stiffeners at mullions.
- b. Aluminum extrusions : ASTM Specification 6063-15
- c. Fastening Devices: Cadmium or Zinc plated
- d. Anchor bolts, pressed or rolled anchor accessories: Galvanized

2.1.2 Types of window requires is indicated on the drawings and schedules.

**2.1.3 ACCESSORIES**

- a. Provide for neat fixation to one another using concealed hardware connectors and stiffeners at mullions.
  - b. Fastening devices : cadmium or zinc plated
  - c. Anchor bolts, pressed or rolled anchor accessories : galvanized
- d. Casement handles – Powder coated,

**2.3 BRANDS AND TRADENAMES :**

Use \_\_\_\_\_--brand or Approved or equal

## **PART 3 - EXECUTION**

### **3.1 FABRICATION**

- a. Factory prefabricate all frames in accordance to the designs and dimensions indicated in the drawings.
- b. Cut, join and fit rails and stiles to hairline joints securely reinforced and jointed by means of concealed fastening wherever possible.
- c. Protective Powdered Coating:

### **3.2 INSTALLATION**

- a. Set and anchor as shown in details and in approved shop drawings.
- b. Set frames plumb and square and brace where necessary to prevent distortion. Windows shall not be forced and shall be securely anchored into the supporting construction.
- c. Wedge clear of masonry all frames set in prepared openings 4.5mm (3/16") to 6mm (1/4") to allow for caulking.

### **3.3 ADJUSTMENTS**

- a. Adjust all frames and attach hardware before glazing.
- b. Secure all windows to be watertight and all hardware operating free & easy.
- c. Surfaces, stains and discoloration shall be cleaned and restored or the window shall be replaced.

### **3.4 INSTALLATION OF HARDWARE**

Install hardware to fit details as shown in the drawings and as per manufacturer's specification. Supply all necessary templates and instructions required.

**08210 : WOOD DOORS**

**PART 1- GENERAL**

**1.1 SCOPE**

- a. Furnish materials and equipment and perform labor required to complete pane doors, louver doors, flush doors, sliding doors and other wood doors.
- b. See drawings and details for sizes, location, extent and other requirements.

**1.2 SAMPLES**

- a. Prior to fabrication of flush, panel and frames, shop drawings shall be submitted indicating materials used, sizes, fastening devices, and finish for approval.
- b. Submit sample corner sections of wood doors and jambs for approval of the Appointed Architect.

**1.3 PROTECTION**

Protect doors adequately from scratches and other stains with heavy building paper. Doors shall also be protected from damage and dampness. Wood doors shall not be brought into the building until all plastering works has been completed and dry.

**1.4 DELIVERY AND STORAGE**

- a. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages, which shall remain unbroken during delivery and storage.
- b. Label package for door opening where used.

**PART 2 - PRODUCTS**

**2.1 Extent And Location Of Each Type Of Flush Wood Door Is Indicated On The Drawings And In Schedules.**

**2.2 MATERIALS**

- a. Flush doors shall be hollow cores dried frames with 6 mm plywood veneer or marine plywood as indicated.

**2.3 FABRICATION**

- a. Assemble joints in doors with water-resistant glue; keep doors under pressure until glue has thoroughly set.
- b. Keep faces free from defects or machine marks that will show through the finish.
- c. Flush Doors Hollow Core: Provide doors with cross banding and edgings. Make face veneer first-quality selected ribbon grain plywood as directed in the drawings or as specified herein. Provide lock blocks of size required for hardware used.



**3.1 INSTALLATION**

- a. Cut, trim and fit each door to its frame and hardware accurately.
- b. Flush, panel shall be leveled, hung plumbed, and fitted accurately allowing 2-mm clearance at the jambs and heads for painter's finish and possible swelling or shrinkage.
- c. Provide not more than 3mm (1/8") clearance at lock and hanging stiles and not more than 6mm (1/4") at bottom.
- d. Round all corners to 1mm (1/16") radius. Bevel slightly all rail edges.
- e. All doors shall operate freely and all hardware shall be properly adjusted and functioning.

**08250 : ALUMINUM SLIDING Glass DOORS**

**PART 1 – GENERAL**

**1.1 SCOPE**

- a. Furnish materials and equipment and perform labor required to complete Aluminum sliding doors, frames, hardware, and accessories.
- b. See drawings and details for sizes, location and extent of work required.

**1.2 SUBMITTALS**

Shop drawings shall be submitted for approval before delivery of doors. A schedule showing the location of each door shall be included with shop drawings. Drawings shall indicate elevations of each door type, details and method of anchorage to opening, details of construction, method of assembling sections, location and installation of hardware, size, shape, and thickness of materials, joints, and connections. Shop drawings for rolling and horizontal sliding doors shall show details of tracks, rollers, fittings, and other attachments.

**1.3 DELIVERY, STORAGE AND PROTECTION**

Sliding Glassdoors shall be delivered, stored, handled, and installed so as not to be damaged or deformed. Abraded, scarred, or rusty areas shall be cleaned and painted immediately upon detection. Doors and frames stored at the site before erection shall be stacked on platforms or pallets and covered with tarpaulins or other suitable covering to provide weathertight enclosure while affording proper air circulation.

Prior to shipment, a clear, powdered coating shall be applied to all surfaces of aluminum.

**1.4 INSTALLATION**

Sliding glass doors shall be leveled, hung, plumbed, and fitted accurately allowing 2 mm clearance

**1.5 FIELD MEASUREMENTS**

The contractor shall verify all measurements at the building site; and shall be responsible for fittings and attachment of items connected with the door installation.

**PART 2 – PRODUCTS**

2.1 Sliding Glassdoor shall be as specified in Section: Glass and Glazing.

2.2 Door frames. Frames shall be of the design and size indicated. Frames shall be set plumb and level, and well braced to prevent distortion.



**08710 : DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 SCOPE**

Furnish materials and equipment and perform labor required to complete door hardware.

**1.2 SAMPLES**

Submit samples of locksets, deadbolts, hinges, door pulls, door stops, door closers and other door accessories for Consultant's approval.

**1.3 DELIVERY AND STORAGE**

Hardware shall be delivered to the job site in their original containers and accessories (keys, screws, templates, instructions) and shall bear model number and manufacturer's name.

**PART 2 - PRODUCTS**

**2.1 Approved by Consultant**

**PART 3 - EXECUTION**

**3.1 INSTALLATION AND PROTECTION OF HARDWARE**

a. Install hardware to fit details as shown in the drawings and as per manufacturer's specifications. Supply all necessary templates and instructions required.

a.1. Hinges :

a.1.1. Top – center of hinge not more than 20 cm below top of door

a.1.2. Bottom – center of hinge not more than 20cm above finished floor

a.1.3. Intermediate hinges – shall be equidistant between top and bottom hinges

a.2. Door closers: unless otherwise indicated, install door closers on the interior side (room side) of doors opening to a hallway or corridor

**b. HARDWARE PROTECTION**

After installation, protect hardware from paint, stains and discoloration until acceptance of work. All hardware shall be checked and adjusted such that they operate properly or else shall be replaced by Contractor. Keys shall be identified and labeled and submitted to the Owner.

**c. APPLICATION OF BUTT HINGES**

- c.1 Top hinges shall be installed with the center of the hinge not more than 20 cm below the top of the door.
  - c.2 Bottom hinges shall be installed with the center of the hinge not more than 20 cm above the finished floor.
  - c.3 Two intermediate hinges shall be installed equidistant between the top and bottom hinges.
  - c.2 Door closing devices shall be installed and adjusted in strict accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls and corridors shall have the closer mounted on the room side of the door.
  - c.6 Submittal requirements. Prior to procurement, the contractor shall submit brochures/catalogs and schedule of application for door locks, door closets, butt hinges, door stop, mortise extension bolt, cabinet concealed hinges, drawer slide and door pull.
- d. **PACKAGING AND MARKING**
- Items of hardware shall be delivered to the jobsite in their original individual containers, with the necessary appurtenances including screws, keys, and instructions. Each individual container shall be marked with the manufacturer's name and catalog number.
- e. **SUBMITTAL REQUIREMENTS**
- Prior to procurement, the contractor shall submit brochures/catalogs and schedule of application for door locks, door closets, butt hinges, door stop, mortise extension bolt, cabinet concealed hinges, drawer slide and door pull.

**08810 : GLASS AND GLAZING**

**PART 1 - GENERAL**

**1.1 SCOPE**

- a. Glass shall be provided in locations as indicated and the corresponding type specified on architectural drawings. All standard procedure on glass and glazing work must be implemented to ensure correct fitting and glazing in order to preserve the physical strength of the glass when used as intended on any building exterior and interior application.
- b. Glazing rabbets shall be rigid, true, plumb, square, properly primed, clean, dry, and dust-free before glazing work is started. Protective coating shall be removed from metal rabbets with an approved solvent. Glazing work shall not be performed during damp or rainy weather. Sashes shall be glazed in a closed position and shall not be operated until the glazing compound has set. Glazing materials shall be mixed uniformly without the addition of thinners or other materials, and shall be used while still fresh.

**1.2 DESCRIPTION**

- a. The Contractor shall be responsible for the correct size and grades of glass to be used, improperly set glass, which does not meet the requirements of its grade and size will not be accepted. Such glass shall be replaced to the satisfaction of the Appointed Architect.
- b. The size of glass indicated is approximate only and the actual size shall be determined by measuring the frames to receive the glass. Glazing rabbets shall be rigid true, plumb, square, properly primed, clean, dry and dust-free, before glazing work is started.
- c. Each piece of glass shall have the manufacturer's label showing the type, thickness and quality of the glass. Labels shall be removed until glazing work has been approved. Putty and glazing compound shall be delivered to the site in unopened containers, plainly labeled with the manufacturer's name and brand.

**1.3 SAMPLES**

Prior to procurement of materials, brochures, catalogs cuts and sample of glasses, glazing sealant and accessories shall be submitted for approval.

**1.4 PROTECTION**

Protect material from loss, injury, staining and breakage. The Contractor at his own expense shall replace lost and damaged materials.

**1.5 DELIVERY AND STORAGE**

Materials shall be delivered to the site in an undamaged condition and stored out of contact with the ground. Upon arrival at the jobsite the glass shall be checked by the Contractor for damage. Glass found damaged, which, in the opinion of the Construction Architect/Engineer, may affect appearance or aesthetic of the glass curtain-wall system,

## 1.6 APPROVED MANUFACTURER

Approved by the Consultant

## PART 2 - PRODUCTS

### 2.1 MATERIALS

Glasses shall be as manufactured or distributed by "Republic - Asahi Glass Corporation" or approved equivalent.

Each glass shall have the manufacturer's label showing the type, thickness, and quality of glass. Labels shall not be removed until the glazing work has been approved

Doors

#### a.2 Framed And Sliding Doors

- 6mm (1/4") thick tempered clear glass powder-coated aluminum frame. See drawings for location and extent of work required.

Observation Windows

- 6mm (1/4") thick clear tempered glass. See drawings for location and extent of work required.

### 2.2 GLAZING

#### a. Glazing materials

- shall comply with all pertinent codes and regulations including recommendations specified on approved standards. For reference, glazing codes and recommendations are based on Japanese Industrial Standard (JIS). The use of non-skinning compounds, non-resilient type preformed sealers, and preformed impregnated type gaskets will not be permitted. When flexible vinyl gasket channels are used, the material shall conform to Commercial Standard CS230. Materials used with aluminum frames shall be aluminum colored, non-staining, and do not require painting. Other materials which will be exposed to view and unpainted shall be gray or neutral color. Glazing materials shall be as specified herein and as recommended by the glass the manufacturer as approved.

a.1. Glazing sealant - single or two-component silicone rubber or two-component polysulfide type.

a.2. Glazing or zipper gasket - flexible chloroprene rubber, extruded in a profile to fit the frame profile and glass thickness to provide full water and air tightness. Type of gasket, sizes, and shapes shall be suitable for use for which they are intended are as follows:

- a.2.1. **U-profile glazing channel** shall be fitted onto circumference of a glass like a picture frame then frames are assembled onto the channel plate. Glazing channel is not recommended for the bottom side of double Glazing Glass or Wired Glass, which has to be provided with drain holes.
- a.2.2. **Retrofit type glazing beads** shall be strung and installed on both sides of glass, which has been fitted into a frame to firmly fix the glass in position.
- a.2.3. **Retro-fit glazing beads** shall be strung and fitted into one side of a glass beforehand, and the other strung beads are inserted into the other side on the site after glass has been installed into the frame.

b. Glazing accessories

- as required to supplement the installation shall be provided on the items to be glazed and provide a complete work. These include glazing points, clips, shims, angles, and beads, setting blocks, edge spacer, back up material, primer and masking tapes. Ferrous metal accessories, which will be exposed in the finished work, shall have a finish that will not corrode or stain while in service.
- b.1. Glazing clips - shall be of zinc-coated steel of nonferrous metal, and shall be of types, sizes, and shapes suitable for the use for which they are intended.
  - b.2. Setting block - shall be chloroprene rubber, trade name-Neoprene, etc., and 90 hardness. Blocks shall be used to correctly position a glass in vertical direction, and to prevent direct contact between glass edge and sash.
  - b.3. Edge spacer - shall be chloroprene rubber, but this lesser hardness and used to prevent dislocation or breakage of a glass by the impact of opening and closing of movable windows.
  - b.4. Back up material - shall be foamed polyethylene, or chloroprene rubber. This shall keep the glass in a correct position in horizontal (front and rear) direction and prevent direct contact between glass surface and sash, and adjust sealing depth.
  - b.5. Primer - shall be clear and based from chlorinated rubber or as recommended by the glass manufacturer.
  - b.6. Masking tape - shall be adhesive paper type and used to prevent contamination of glass or sash during application of primer or filling of sealant, and to maintain neat edge line of sealant. The following care must be taken in choosing masking tape to be use.
    - b.6.1. Masking tape should not affect adhesiveness of primer or sealant.
    - b.6.2. Adhesive used on masking tape should not contaminate glass or sash, or should not exfoliate such paint coats when masking tape is removed.
    - b.6.3. Masking tape must have appropriate thickness and hardness to allow folding back when used on the portions having complex configurations.

## PART 3 – EXECUTION

### 3.1 GENERAL

Work instruction on glass fitting and installation should strictly follow a standard precautionary measure to avoid damage or breakage on glass and to secure total work safety. Glazing and fitting methods shall depend on the type of frame and the glass to be used. Glazing on conventional frame section such as aluminum shall be glazing bead, glazing channel or sealant as caulking materials while glazing on concrete or metal channel support shall be sealant or glazing gaskets.

### 3.2 INSTALLATION

- a. Glass shall be accurately cut to fit opening and with equal bearing on the entire width of pane.
- b. Glass shall be set in hollow metal door in felt channel, inserts, or bedded in putty to prevent any rattle.
- c. Prevent glass from all contact with metal or any hard or sharp materials by use of resilient shims placed at quarter points.

Use resilient sealants.

Use stops in sizes permitting “good grip” on the glass.

Install glass only in openings that are rigid, plumb and square.

Allow sufficient clearance at edges of glass to compensate for its expansion or for some settlement of the building. Clearance should be 6mm (1/4”) from some edge to frame and 3mm (1/8”) for face.

- d. The glazing Contractor shall perform removal of putty or glazing compound and smears from glass during the material's normal work life. Failure to do so may result in damage to the glass.
- e. Glazing work shall not be performed during very damp or rainy weather. Sashes shall be glazed in closed position, and shall not be operated until the glazing compound has set.

### 3.3 PROTECTION

Materials shall be protected from loss, injury, staining and breakage. Upon completion of the work and after inspection, all glass surface shall be thoroughly cleaned removing all paint spots and labels. At time of acceptance of the work, all glass putty and other setting materials shall be cleaned, whole and in perfect condition.

### 3.4 CLEANING

Upon completion of the building, cracked, broken or imperfect glass, or glass which has been set improperly shall be replaced. Glass surfaces shall be thoroughly cleaned, with labels, paint spots, putty, and other defacements removed, and shall be clean at the time the work is accepted.

**08350 : (Sliding Curtain track System)**

**PART 1 - GENERAL**

**1.1 SCOPE**

- a. Furnish materials and equipment and perform labor required to complete folding partitions, frames, rollers, hardware and accessories.
- b. See drawings and details for sizes, location and extent of work required.

**1.2 SUBMITALS**

Shop drawings, brochure or catalog cuts of the Curtain Track Partition intended to be used including the type of finish and color shall be submitted for approval before delivery. Shop drawings shall show details of tracks, rollers, fittings and other attachments.

**1.3 DELIVERY, STORAGE AND PROTECTION**

Pre-fabricated folding partitions shall be protected against damage and dampness. They shall not be brought into the building until painting work has been completed.

**1.4 INSTALLATION**

Follow Material Instruction Catalog

**PART 2 – PRODUCTS**

To be approved by the Consultant

**09220 : PORTLAND CEMENT PLASTER**

**PART 1- GENERAL**

**1.1 SCOPE**

- a. Furnish all materials and equipment and perform labor required to complete all plain cement plaster finish.
- b. See drawings for details of Materials and Finishes.

**1.2 DELIVERY AND STORAGE**

Materials shall be delivered in their original containers bearing manufacturer's name and brand. Cement and lime shall be stored off the ground under watertight cover, and away from sweating walls and damp surfaces, until ready for use. Damaged or deteriorated materials shall be removed from the premises.

**PART 2 - PRODUCT**

**2.1 PLAIN CEMENT PLASTER FINISH (SMOOTH)**

- a. Consisting of the scratch and finish coats, both consisting of one (1) part Portland cement and two (2) parts of clean, washed sand, measured by volume.
- b. For all interior or exterior wall surfaces as called for in the Drawings and where plastering is essential to complete the work.

**PART 3 - EXECUTION**

**3.1 PLAIN CEMENT PLASTER FINISH**

- a. Provide all walls indicated with three coats of cement plaster (scratch coat and finish coat). Mix each coat in the proportion of one part Portland cement to three parts sand by volume.
- b. Apply the scratch coat with sufficient material and pressure to ensure a good bond and then scratch to a rough surface. Dampen with water before applying brown coat. Apply brown coat one day after applying a scratch coat with a thickness of 10mm and level to flat even surface.
- c. When stiff enough, trowel with wooden float and cross-hatch or broom lightly and evenly to secure a good mechanical bond for the finish coat. Wet the surface and keep from drying out at least three (3) days.
- d. Apply finish coat seven (7) days after the application of brown coat. Provide thickness of 3mm (1/8"). Keep the finish coat not saturated for a period of seven (7) days.



Upon completion of the building and when directed, all loose, cracked, damaged, or defective plastering shall be cut out and re-patch in a satisfactory and approved manner. All point-patching of plastered surfaces, and plaster work abutting or adjoining any other finish work, shall be done in a neat and workmanlike manner. Plaster droppings or splattering shall be removed from all surfaces. Exposed plastered surfaces shall be left in a clean unblemished condition ready to receive paint or other finish. Protective coverings shall be removed from floors, other surfaces, and all rubbish and debris shall be removed from the building. Finished plaster work which is defective and damaged or containing discoloration shall not be accepted and shall be removed and replaced with proper materials conforming to the requirement of the Specification and satisfactory to the Contracting Officer. The Contractor shall do all patching and troweling following the installation of plumbing, wiring and other necessary procedures.

**09310 : TILE WORKS**

**PART 1- GENERAL**

**1.1 SCOPE**

- a. Furnish all materials and equipment and perform labor required to complete all Homogeneous tile works.
- b. See drawings for details of Materials and Finishes.

**1.2 DELIVERY AND STORAGE**

Materials shall be delivered in their original containers bearing manufacturer's name and brand. Tiles shall be protected against wear and dampness.

**1.3 MAINTENANCE TILE STOCK**

As an additional requirement during turnover and prior to Final Turnover, the Contractor will endorse to the Owner's Project Manager 30 pcs. of each type/size/color and exact brand of tiles used within the Project with the end in view of providing stock which will flawlessly blend with the completed work in the event that the replacement of pieces should become necessary.

**1.4 SUBMITTALS**

Submit to the Consultant sample of materials for approval prior to installation.

**PART 2 - PRODUCT**

**2.1 GENERAL**

The work shall not be started until the roughing-in for plumbing and electrical work has been completed and tested. The work of all other trades in the area where tile work is to be done shall be protected from damage in a skillfully manner and as directed.

**2.2 TILE FINISH**

- 2.2.1 Tiles finish shall be approved by consultant. Finish shall be clean, plumb and true to line.
- 2.2.2 For floor and wall areas requiring the finish.
- 2.2.3 Use Tile Grout and adhesive,
- 2.2.4 Color same as the tile.
- 2.2.5 Use tile adhesive for installation. Submit actual samples for approval.

- b. 600 x 600 mm
  - Un-polish Vitrified Homogeneous Floor Tiles
  - Color: for Consultant's approval
  - Vitrified Slip Resistance Glazed Ceramic
  - Floor tiles and walls

**MORTAR AND PLASTER WORKS**

- a. Use ADHESIVE MORTAR for laying vitrified ceramic tiles with DISPERSION COMPOUND as an additive to ADHESIVE MORTAR.
- b. Use GROUT pre-mixed dry well filler for floor and wall tile joints either glazed or unglazed tiles. Color should be the same as the tiles, as approved by Consultant.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION OF WALL PLASTER**

Tiles shall be installed over an even, plumb and firm substrate that is clean and free from deleterious substances.

### **3.2 FLOOR TILES INSTALLATION WITH ABC TILE ADHESIVE**

- a. Before spreading the setting bed, establish lines of borders and center the work in both directions to permit the pattern to be laid with a minimum of cut tiles.
- b. Keep tile joint parallel and straight over the entire area by using straight edges.
- c. Lay tiles from centerline outward and make adjustment at walls. Keep the gap between tiles with 2.0mm-3.0mm.

### **3.3 WALL TILE ON TILE ADHESIVE**

- a. Before application of plaster, dampen the surface of the scratch coat evenly to obtain uniform suction.
- b. Use temporary or spot grounds to control the thickness of the plaster. Fill out the plaster even with the grounds and rod it to true plane.
- c. Apply the tile adhesive over an area no greater than to be covered with tile while the coat is still plastic.
- d. Completely immerse wall tile in clean water and soak it at least ½ hour. After removal, stack tile on edge long enough to drain off excess water. Re-soak and drain individual tiles that dry along the edges. Allow no free moisture to remain on the back of tile during setting.
- e. Lay tile fields in rectangular block areas not exceeding tile area. Cut the setting bed through its entire depth along the edges of each block area after placement and before subsequent blocks are installed.
- f. Within one (1) hour after installation of tile, remove strings from string-set and wet the faces of face-mounted tile and remove the paper and glue. Avoid using excess water. Adjust any tile that is out of alignment.

### **3.4 GROUTING**

- a. Grout newly installed tiles after 24 hours of setting and curing. Prior to grouting, tiles and grout spaces shall be clean.
- b. Using a rubber-faced float, spread the grout over the tiled surface, applying just enough pressure to fill the spaces between tiles.
- c. After 5 minutes, apply a wet sponge until grout is flush with tile surface. Tool the filled joints with the sponge. Wipe remaining residue with a clean dry cloth.

- d. Grouted areas may be opened to foot traffic after at least 24 hours of setting and curing. Apply grout sealers on the tile grouts after 24 hours to protect grout from discoloration. Page 44 of 162

### 3.5 CLEANING

Sponge and wash thoroughly with water after the grout has stiffened. Then clean by rubbing damp cloths or sponges and polish with clean dry cloth.

**DIVISION 9 : FINISHES****09250 : GYPSUM WALLBOARD / DRYWALL SYSTEM****PART 1- GENERAL**

Due to the large investment in the medical equipment and request of Philips Medical Systems. all rooms have been insulated against water, fire and dampness, which insure 100% warranty on the equipment supplies. Any variation to this would require certification from the Architect.

**1.1 SCOPE**

Furnish all materials, labor and equipment necessary to complete the installation and finishing of gypsum wallboard or drywall system.

**1.2 SUBMITTALS**

- a. Submit catalog information for each type of gypsum boards, fastener, joint treatment material, adhesive, framing and furring members and other accessories. Clearly mark data which type or item will be provided.
- b. Installation instructions.
- c. Submit Detail drawing and/or shop drawings showing installation and assembly to enable checking of the conformity with the contract requirements.
- d. Submit samples of standard color of Gypsum Board.

**1.3 STORAGE AND HANDLING OF MATERIALS**

Storage and handling of materials shall be provided during fabrication, shipments, storage and erection.

Handling: Neatly stack gypsum board flat to prevent sagging or damage to the edges, ends, and surfaces.

Storage: Jobsite storage shall be in a clean, dry area out of direct contact with the ground, under cover and sloped for drainage, protected from abuse by traffic and from contamination by corrosive or staining materials. Stored materials and unfinished work shall be secured against wind damage. Provide adequate ventilation to prevent condensation.

**PART 2 - PRODUCT****2.1 GYPSUM BOARD**

- Non-Asbestos, 12 and 16 mm thick x 1.22 m x 2.44 m (4' x 8') per piece (for wall), 12 mm thick x 1.22m x 1.22 m (4' x 4') per piece (for ceiling), regular and water resistant type, tapered edges, approved by the Contracting Officer. Installation shall only be done by approved, qualified and trained installer recommended by the manufacturer.

**a. Gypsum Wallboard**

- Regular, fire-rated types, 12 mm thick, to be installed at interior walls (inner side of the room)

- b. Mold and Water-Resistant Gypsum Backing Board
  - regular and fire-rated types, 12mm typical thickness.
  - to be installed on ceiling of all Toilets, Dirty Utility Rooms and Molecular rooms with emergency showers.
- c. Joint Treatment: ASTM C-475 and ASTM C-840, 3-coat system.
  - c.1 Joint Tape
    - Cross-fibered paper tape with nominal longitudinal stretch and high tensile strength.
  - c.2 Setting Type Joint Compound
    - Factory pre-packaged, chemical hardening powder products formulated for uses as indicated.
    - c.2.1 For use as topping and taping compounds, use formulation for each which develops greatest bond strength and crack resistance and is compatible with other joint compounds applied over it.
    - c.2.2 For pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
  - c.3 Drying-Type Joint Compound
    - Factory pre-packaged vinyl- based products complying with the following requirements for formulation and intended use.
    - c.3.1 Ready-Mix Formulation: Factory-premixed product.
    - c.3.2 Taping compound formulated for embedding tape and for first coat over fasteners and flanges of corner beads and edge trim.
    - c.3.3 Topping compound formulated for second and third coats.
    - c.3.4 All purpose compound specifically formulated and manufactured for use as both taping and finishing compound, and compatible with tape, substrate and fasteners.
- d. Galvanized Steel Framing Component for Suspended and Furring Channel. ASTM C 754.
  - d.1 Concrete Inserts
    - Metal dowels designed for embedment in concrete, fabricated from corrosion-resistant materials, and the hanger rod to be screwed to sustain without failure, a load equal to 3 times that imposed by ceiling construction.
  - d.2 Hanger Rods
    - 6.3 mm dia. mild steel, galvanize finish, threaded on both ends with nuts.
  - d.3 Carrying Channels

- G.I. Gage #18; 10 mm x 37 mm x 2.44 m to 5.9 m

d.4 W-furring Channel

- G.I. Gage #26; 18 mm x 45 mm x 2.44 m to 5.9 m

d.5 Wall Angle

- G.I. Gage #26; 18 mm x 45 mm x 2.44 m to 5.9 m

## 2.2 TRIM ACCESSORIES

a. Material: Metal Trim

b. Types

- Cornerbead, edge trim and control joints. Recessed joints in gypsum board systems are to be limited to vertical applications. The use of horizontal joints for aesthetic treatments in clinical or treatment areas is to be minimized for reduction of infection control risk.

## 2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

a. Steel Studs and Runners

- ASTM C-645, 20 gauge steel studs, 3-16mm typical depth.

b. Furring Channels

- ASTM C-645, 20 gauge

c. Auxiliary Framing Components

- Furring brackets, resilient furring channels, z-furring members and non-corrosive fasteners.

## 2.3 AUXILIARY MATERIALS

a. Gypsum Board screws

b. Gypsum Board nails

c. Fastening Adhesives

d. Concealed Acoustic sealant

e. Mineral Fiber sound attenuation blankets

f. Mineral fiber sound insulation.

g. Polystyrene aggregated finish for ceilings.

h. Nonwoven polymeric sheet air infiltration barrier.

i. Fasteners, Type S steel drill screws with corrosion-resistant finish.

## 2.2 BRANDS / MANUFACTURER

To be approved by Consultant



## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- a. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

- b. Ceiling Anchorage

Coordinates installation of ceiling suspension system with installation of overhead structural systems to ensure that insets and other structural anchorage provisions have been installed to receive anchors in a manner that will develop their full strength and at spacing required to support ceiling.

- b.1 Furnish concrete inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

### **3.2 INSTALLATION OF GALVANIZED STEEL FRAMING**

- a. Steel Framing Installation Standard

Install Galvanized Steel Framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

- b. Installation of supplementary framing, blocking and bracing at terminations in the work for support of fixtures, equipment services, heavy trim, furnishings and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer.

- c. Isolate Steel Framing of building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on the drawings.

- c.1 Where edges of suspension ceiling perimeter or penetration of structural elements.

- c. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members or as indicated.

### **3.3 INSTALLATION OF STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS**

- a. Secure hangers to structural support by support by connecting directly to structure where possible, otherwise connect to cast in concrete inserts or other anchorage devices or fasteners as indicated.

- a.1 Do not attach hangers to underside of concrete slabs with power-actuated fasteners.

- b. Do not connect or suspend steel framing from ducts, pipes or conduits.

- c. Keep hangers and braces 50 mm clear of ducts, pipes and conduits.
- d. Sway brace suspended steel framing with hangers used for support.
- e. Install suspended steel framing components in sizes and spacing indicated but not less than required by reference steel framing installation standard.
  - e.1 Hanger rods; 120 cm on center
  - e.2 Carrying channels (main runner); 120 cm on center
  - e.3 Furring channels (furring members); 60 cm on center
- f. Installation Tolerances; Install steel framing components for suspended ceiling so that cross furring members of grid are level to within 3.1 cm in 3.65 m as measured both lengthwise on each member and transversely between parallel members.
- g. Clip furring members to main runners and to other structural support as indicated.
- h. For exterior soffits provide cross-bracing and additional framing indicated or required to resistant wind uplift.

### 3.4 INSTALLATION OF STEEL FRAMING FOR WALLS AND PARTITION

#### a. Installation Tolerances

Install each steel furring member so that fastening surface do not vary more than 3.1 cm plane of faces of adjacent framing.

- b. Extend Steel Furring full height to structural support or substrates above suspended ceiling, expect where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
- c. Terminate partition framing at suspended ceilings where indicated.
- d. Install steel furring in sizes and at spacing indicated but not less than that required by referenced steel framing installation standard.

### 3.5 APPLICATION AND FINISHING OF GYPSUM BOARD

- a. Gypsum Board Application and Finishing: Install and finish gypsum board to comply with ASTM C 840.
- b. Install Gypsum Boards in a manner, which minimizes the member of end-butt or avoids them entirely where possible.
- c. Install exposed gypsum board with face side out. Do not install imperfect damages or damp boards. But boards together for a light contact at edges and ends with not more than 1.6 mm open space between boards. Do not force into place.
- d. Locate either edge or end joint over supports, except in horizontal applications where intermediate supports or gypsum board back blocking is provided behind and joints. Position boards so that like edge abuts, tapered edges against tapered ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

- e. Attach gypsum board to steel furring so that leading edge or end of each board is attached to open (unsupported) edge of stud flange first.
- f. Attach gypsum board to supplementary framing and blocking provided for additional support at opening and cut outs.
- g. Space fasteners in gypsum board in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

### 3.6 METHODS OF APPLICATION

- a. General: Apply a joint treatment at gypsum board joints (both directions); penetrations; fastener heads, surface defects and elsewhere as required to prepare works for decoration.
- b. Prefill open joints, using setting-type joint compound.
- c. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
- d. Finish interior gypsum board by applying the following joint compounds in 3 coats (not including prefil of opening in bases), and sand between coats and after last coat.
  - d.1 Embedding and First Coat: Setting-Type Joint Compound.
  - d.2 Fill (second) Coat: Ready Mix drying-type all purpose or topping compound.
  - d.3 Finish (third) Coat: Ready Mix drying-type all purpose or topping compound.
- e. Finish exterior gypsum soffit board by using setting type joint compounds to prefil joints, embed tape to apply first, full (second) and finish (third) coats; smooth each coat before joint compound hardens to minimize need for standing; sand between coat and after finish coat.

### 3.7 PROTECTION

Provide final protection and maintain conditions, in a manner suitable to installer, which ensures, gypsum board constructions being without damage or deterioration at time of substantial completion.

**DIVISION 9 : FINISHES****09270 : DRYWALL ACCESSORIES****PART 1- GENERAL****1.1 SCOPE**

Furnish all materials, labor and equipment necessary to complete the installation of gypsum wallboard for walling and ceiling.

**1.2 SUBMITTALS**

- a. Brochures or catalog cuts of gypsum wallboard, framing and furring members, shall be submitted prior to procurement.
- b. Installation instructions.
- c. Complete shop drawings.

**1.3 STORAGE AND HANDLING OF MATERIALS**

Storage and handling of materials shall be provided during fabrication, shipments, storage and erection. Jobsite storage shall be in a clean, dry area out of direct contact with the ground, under cover and sloped for drainage, protected from abuse by traffic and from contamination by corrosive or staining materials. Stored materials and unfinished work shall be secured against wind damage.

**1.4 LOCATION**

Refer to Architectural Drawings.

**PART 2 - PRODUCT****2.1 ADHESIVES**

For joint and fastener concealment shall be of the types recommended in writing by the wallboard manufacturer and as approved for the following uses:

- a. Embedding compound for first and second coats
- b. Finishing compound for final coat.

**2.2 BACKING BOARD**

Shall be of the grade and form required for the installation.

**2.3 CEILING METAL FRAMING ASSEMBLIES**

- a. Hangers shall be pre-punched, hot-dipped galvanized steel 1.0 mm thick.
- b. Suspension rod shall be hot-dipped galvanized steel 6.0 mm diameter.

- c. Carrying channel clip shall be spring steel clip 0.6 mm thick.
- d. Furring channel joiner and furring clip shall be galvanized steel, gauge 24 thick.
- e. Furring member shall have double crading, galvanized steel 5.0 m long; 0.40 m thick, configuration and size as shown hereinafter.
- f. Carrying channel and wall angle shall be 5 meters long, gauge 19 and 2.4 or 3.0 meters long, gauge 24 thickness respectively, configuration and sizes as shown hereinafter.

2.4 WALL AND PARTITION METAL ASSEMBLIES – shall be powdercoated, and are as follows:

- a. Track, top and bottom shall be galvanized steel gauge 22 or 24 and 2.4 or 3.0 m long.
- b. Stud shall be galvanized steel, gauge 22 or 24 and 2.4 or 3.0 m.

2.5 FASTENERS

- a. Bolts and Nuts shall be as recommended by the framing manufacturer, steel and zinc-coated.
- b. Expansion Shields shall be of type and class applicable.
- c. Powder-driven fasteners may be used only when approved in writing.
- d. Screws for wallboard attachment shall be shouldered flat-head design for use with special power-driven tools.
- e. Toggle bolts shall be of the type and class best suited for the purpose.
- f. Gypsum wallboard shall have taper-edged, and of the grade and form hereinafter specified. Wallboard shall be supplied in 48-inch width and in such lengths as will result in a minimum of joints.
- g. Regular wallboard shall be 12 mm thick, unless otherwise indicated.
- h. Fire-retardant wallboard shall be 5/8-inch thick.

## **PART 3 - EXECUTION**

### **3.1 CEILING FRAMING SYSTEMS**

Framing for furred ceilings shall be installed at the locations indicated and shall conform to the following:

- a. **Suspended Ceilings**

Ceiling framing shall consist of 38 mm steel main runner channels suspended plumb from structural slab or frame by hanger wires or straps, spaced at not less than 1.20 m on centers.

- a.1. Hanger wires shall be wrapped around the reinforcing bars, of the supporting concrete-slab construction with twists before concrete is placed or shall be shaped into a 100 mm diameter loop and embedded at least 50 mm in the concrete, or shall be attached to approved inserts.
- a.2. Hanger wires shall be looped around bottom chord of open-web steel joists and shall receive three full turns around itself, or around structural steel members or to attached beam clamps and shall receive three full turns around itself.
- a.3. Hanger strap shall be hung plumb and connected with 3/8 inch galvanized bolts and nuts to anchors made of hanger strap set in the concrete, or shall be looped around structural framing and connected to itself with 3/8 inch galvanized bolts and nuts.
- a.4. Hanger wire shall be saddle-tied to main runner channels and shall receive three full turns around itself.
- a.5. Hanger strap shall be looped under main runner channels to form stirrups and through-bolted to channels using 3/8 inch galvanized bolts and nuts.
- a.6. Main runner channels shall be located within 150 mm of parallel walls and shall be cut short of abutting wall 12 mm plus or minus 6 mm.
- a.7. Where channels are spliced, the ends shall be overlapped not less than 12 inches with flanges of channels interlocked and securely tied near each end of the splice with two loops of 1 mm tie wire or the ends may be joined by approved standard main runner couplings.
- a.8. Splices shall be staggered.

b. Attached Ceilings

Framing is not required for ceilings attached to structural members, except for framing openings as specified. Furring as hereinafter specified shall be attached directly to structural members.

### 3.2 FURRING

Steel channels or steel studs shall be provided where steel furring is indicated for screw attachment of gypsum wallboard.

a. Walls

- a.1. Furring channels shall be spaced 0.40 m on centers. Furring shall be secured to masonry or concrete with concrete nails, toggle bolts, or screw with expansion shields at not more than 0.60 m centers.
- a.2. Fasteners shall be staggered in alternate flanges of channel with one fastener located within 0.15 m of each end.
- a.3. Furring shall be set plumb or level and rigid using shims of galvanized steel wherever necessary to assure a finished wall surface in a true, even plane.
- a.4. Wallboard abutting dissimilar wall or ceiling materials shall have edges finished with casing beads aligned to provide a finished joint.

b. Ceilings

- b.1 Hat-shaped furring' members shall be spaced .40 m on centers and securely attached across suspended runner channels or structural framing members with wire clips or double-strand of 1.0 mm tie wire saddle-tied at each crossing.
- b.2 Ends of wire ties shall receive three full twists. Furring shall be spliced with 0.20 m nested laps securely tied near each end of lap, with two loops of 1.0 mm tie wire.
- b.3 Splices shall be staggered. Furring channels shall be located within 50 mm of walls.
- b.4 Where wallboard abuts dissimilar wall materials, perimeter of ceilings shall be finished with an edge bead trim strip applied to wall and accurately aligned with the finished ceiling.
- b.5 Wallboard edges adjoining walls shall be laid on the horizontal leg of the trim strip against a continuous bead of approve type sealant.

### 3.3 STEEL FRAMING

Non-load-bearing walls and partitions shall be framed with 64 mm and 92 mm steel studs and runners installed as indicated and as hereinafter specified. Studs shall be spaced not more than .60 m on centers and end studs in adjoining walls shall be interconnected with screws spaced at not more than 0.60 m centers.

- a. **Floor and ceiling runners** shall be accurately aligned and securely attached to floors and to structural ceilings or roof deck except where partition-ceiling runners are applied directly to finish material of continuous ceilings. Attachment shall be by expansion shields, machine bolts, or other approved method, at not more than 0.60 m centers and to furred ceilings by wallboard screws at each furring member. Furring will be provided at ceiling runners oriented parallel to the direction of furring members. Runners shall extend beyond open-end partitions for 0.30 m. Upon installation of end studs, runner extensions shall be bent and nested with the stud and attached thereto with two wallboard screws. Runner shall be in the longest possible lengths with butt joints between lengths.
- b. **Studs** shall be positioned plumb in ceiling and floor runners and securely attached with not less than one wallboard screw on each side of the stud ends. Stud shall be installed in continuous lengths with no splicing in lengths up to 5 m for 92 mm studs, 3.5 m for 75 mm studs, and 9 feet for 64 mm studs.
- c. **Special framing** for beams, columns, soffits, and other special items shall be sized and built to the shapes or forms indicated by rigidly securing each intersection with wallboard screws.

### 3.4 FRAMED OPENINGS

- a. Ceiling Openings
  - a.1. Support members shall be provided at ceiling openings such as required for access panels, recessed light fixtures, and for air supply or exhaust.
  - a.2. Support members of not less than 38 mm main runner channels and suspension wires or straps shall be located to provide at least the minimum support specified herein for furring and wallboard attachment.

- a.3. Intermediate structural members, although not a part of the structural system, shall be provided for attachment or suspension of support members.

### 3.5 APPLICATION

Wallboard shall be applied with the separate boards in moderate contact but not forced into place. At internal and external corners the cut edges of the boards shall be concealed by the overlapping covered edges of the abutting boards. The boards shall be so staggered that the corners of any boards will not meet a common point except in vertical corners.

#### a. Ceilings

Wallboard shall be applied to the ceilings with the long dimension of the wallboard, at right angles to the furring members. Wallboard may be applied with the long dimension parallel to furring members that are spaced 16 inches on centers when attachment members are provided at end joints.

#### b. Walls

##### b.1 Single-ply horizontal application

The long dimension of the panels shall be placed at right angles to the furring or framing members. End joints, where required, shall be made over furring or framing members.

##### b.2 Single-ply vertical application

The long dimension of the panels shall be placed parallel to the furring or framing members. The panels shall be of the length required to reach from the ceiling line to the floor line in one continuous length. Joints shall be made over framing or furring members.

##### b.3 Control Joints

Shall be formed of casing bead trim installed back-to-back over separate framing or furring members. A spacing of 3 mm shall be maintained between opposite beads. Control joints shall be located as indicated.

### 3.6 ATTACHMENT

If the paper surface is broken in nailing or screwing, another nail or screw shall be driven approximately 50 mm from the faulty nailing or screwing. Attachment of wallboard to steel furring and steel framing shall be screw fasteners only. Nailing or screw attachment shall proceed from central portion of wallboard toward end and edges.

### 3.7 JOINT AND FASTENER CONCEALMENT

Areas to be treated shall be inspected by the contractor to ascertain that wallboard fits tightly against supporting framework, and these areas shall be heated to not less than 55 degrees F. for 24 hours prior to commencing treatment, during treatment, and until adhesive compounds have dried. Application shall be by machine or hand tool. A minimum drying time of 24 hours shall be allowed between adhesive coats. Additional drying time may be necessary in poorly ventilated areas.



a. Embedding Compound

- a.1 Shall be applied to wallboard joints and fastener heads in a thin uniform layer.
- a.2 Compound shall be spread not less than 75 mm wide at joints, and reinforcing tape shall be centered on the joint and embedded in the compound.
- a.3 A thin layer of compound shall be spread over the tape.
- a.4 After this treatment has dried, a second coat of embedding compound shall be applied to wallboard joints and fastener heads.
- a.5 Compound shall be spread in a thin uniform coat and not less than 150 mm wide at joints. Treated areas shall be sanded to eliminate ridges and high points.

b. Finishing Compound

After embedding compound has dried, a coat of finishing compound shall be applied to joints and fastener heads. Finishing compound applied at joints shall be feathered out to not less than 12 inches wide. After compound has dried, the treated areas shall be sanded as necessary to obtain uniformly smooth surfaces. Care shall be taken not to scuff the paper surface of the wallboard.

### 3.8 CORNER TREATMENT

a. Internal Corners

Shall be treated in the manner specified herein before for joints, except that the reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.

b. External corners

Shall have corner bead fitted neatly over the corner and secured with the same type fasteners used for applying wallboard. The fastener shall be spaced approximately 150 mm on centers and driven through the wallboard into the framing member. After the corner-piece has been secured in place, the corner shall be treated with joint compound and reinforcing tape in the manner herein before specified for joints. The joint compound shall be feathered out from 200 mm to 250 mm, on each side of corner.

**09900 : PAINTS AND COATINGS**

**PART 1- GENERAL**

**1.1 SCOPE**

Furnish all materials and equipment and perform labor required to complete all painting and varnishing work.

See drawings for location, quantity and extent of surfaces to receive paint and varnish.

**1.2 SUBMITTALS**

Submit sample panels in the selected color or shade on 300 x 600 mm plywood panels for Appointed Architect's approval.

**1.3 DELIVERY AND STORAGE**

Materials shall be delivered in their original containers bearing manufacturer's name and brand.

**PART 2 – PRODUCT**

**2.1 PAINTS AND COATINGS**

Use one brand of paint all throughout. All exposed finish hardware, lighting fixtures and accessories, plumbing fixtures and accessories, glasses and the like shall be adequately protected that these are not stained with paint and other painting materials prior to painting works.

All other surfaces, which stains and are in danger of paint marks should be taped and covered with craft paper or equal.

**EXTERIOR:**

Surface must be dry and clean, light sanded.

**a. Epoxy Finish Coat (Sprayed on)**

a.1 To be applied for all interior metal surfaces – Steel trusses and frames, steel rafters and purlins, base plates, sag rods, metal furrings and miscellaneous metals.

**a.2 USE PAINT  
OPTION 1:**

- (a) Primer Coat: Epoxy Zinc Chromate
- (b) Top Coat: Two coats of Epoxy Enamel

**OPTION 2:**

- (a) Primer: DV Epoxy Zinc Chromate Primer

b. Chlorinated Rubber Base paint:

- b.1 To be applied at parking marking lines.
- b.2 Two coats FOB 512-W-B Chlorinated Rubber Base Paint  
DV Chlorinated Rubber Base

c. Semi-gloss Paint (Acrylic Solvent type):

- c.1 To be applied at building exterior concrete masonry surfaces: columns, beams and for exterior base strip.

c.2 USE PAINT

- OPTION 1:
- (a) Prime Coat: Primer
  - (b) Top Coat: Semi-gloss Topcoat

Mixes:

- (1) Apply one coat CONCRETE SEALER and two coats SEMI-GLOSS TOPCOAT paint.
- (2) Fill up cracks and crevices and putty minor cracks and surface imperfections with prior to application of finish coats.

- OPTION 2:
- (a) Concrete Primer Sealer
  - (b) Latex Concrete Putty
  - (c) Concrete Primer Sealer
  - (d) Megacryl Semi-Gloss Latex White (2 Coats)

d. Semi-gloss textured Paint: Masonry surfaces shall be treated with MASONRY NEUTRALIZER.

- d.1 To be applied at building exterior masonry walls.
- d.2 USE PAINT

- OPTION 1:
- (a) Prime Coat: B1705
  - (b) Top Coat: B1715

Mixes:

- (1) Apply one coat ACRYTEX PRIMER, one coat (spray) ACRYTEX CAST, press with roller; then apply two coats of ACRYTEX SEMI-GLOSS TOPCOAT.

- OPTION 2:
- (a) Prime Coat: Liquid Tile Primer
  - (b) Top Coat: Liquid Tile Semi-gloss

Mixes:

- (a) Liquid Tile Penetrating Sealer.
- (b) Liquid Tile Cast
- (c) Liquid Tile Primer
- (d) Liquid Tile Semi-Gloss Top Coat
- (e) Putty Imperfection with Liquid Tile Putty Filter

## INTERIOR

Surface must be dry and clean, light sanded.

a. Semi-Gloss Paint (Latex Type).

a.1 To be applied on walls as indicated in the drawings.

a.2 USE PAINT

- OPTION 1:
- (a) Permacoat Flat Latex
  - (b) Permacoat Semi-gloss Latex

Mixes :

- (1) Apply MASONRY PUTTY on surfaces to putty all surface defects after the first coat of FLAT LATEX paint dries.
- (2) Then apply two (2) coats of SEMI-GLOSS LATEX paint.

- OPTION 2:
- (a) Concrete Primer Sealer
  - (b) Latex Concrete Putty (Ready Mix)
  - (c) Concrete Primer Sealer
  - (d) Semi-Gloss Latex White (2 coats)

b. Lacquer Enamel Paint:

b.1 To be applied at: For all cabinet surfaces (Interior and Exterior sides), and as indicated on Drawings

b.2 USE PAINT

OPTION 1: (a) Prime Coat: Lacquer Spot Primer

(b) Top Coat: Automotive Lacquer

*Mixes :*

(a) Apply foliate wood dough or LACQUER SPOT PUTTY to holes and cracks then apply one (1) coat of LACQUER Primer SURFACER White.

(b) Sand smoothly surface and apply one (1) coat of LACQUER SPOT PUTTY White to entire primer surfaces.

(c) Repeat application of one (1) coat LACQUER PRIMER SURFACER White. Apply topcoat of AUTOMOTIVE LACQUER by airbrush

OPTION 2: (a) 780 Auto Lacquer Primer Surface

(b) Auto Lacquer Putty

(c) Auto Lacquer Primer Surface

(d) Auto lacquer Topcoat (3 coats)

c. Technicolor/ Multicolor Paint: Masonry surfaces shall be treated with MASONRY NEUTRALIZER

c.1 To be applied on walls at Main Waiting Areas and others as specified on the drawings.

c.2 USE PAINT

OPTION 1: (a) Prime Coat: Permacoat Latex

(b) Top Coat: Multi-fleck

*Mixes :*

(1) Minor cracks as well as surface imperfections should be puttied Acrytex Cast after first coat of PERmacoat Latex dries up.

(2) Apply second coat of Permacoat Latex

(3) Apply topcoat of Multi-fleck.

OPTION 2: (a) Acrylic Concrete Primer and Sealer, by brush, roller or spray. (1 coat)

(b) Flat Latex

(c) da Vinci, by spray. (1 coat)

## **PART 3 - EXECUTION**

### **3.1 PREPARATION OF SUBSTRATE**

Substrate shall be clean, dry and free from deleterious materials.

- a. For Old or Previously Painted Concrete and Masonry Surfaces
  - a.1 Scrape off loose, scaling and peeling old paints. Sand the whole surfaces including those where old paint still adheres very well.
  - a.2 For areas with extreme chalking problems, steel brush, blow air from a compressor or wipe with a clean rag pre-wetted with water. Let dry, then apply one (1) coat of concrete sealer. Dry for at least 4 hours before applying subsequent coats.
  - a.3 For areas affected by molds and mildew, wash the whole surface with water or with hypochlorite washing solution. Scrub using a stiff nylon brush, then rinse with water. Apply fungicidal washing compound. Leave overnight.
  - a.4 For areas with mapping problems, properly prepare the surface then apply concrete sealer. Dry for at least 4 hours.
- b. For Previously Painted Metal (Ferrous) Surface
  - b.1 All areas to be painted must be dry and free from all dirt, dust, oil, grease, wax and other contaminants.
  - b.2 If the existing paint is sound and shows normal chalking, sand lightly and wipe surface dust-free.
  - b.3 If the existing paint is cracked, alligatored, peeling or in a general poor condition, remove rust by scraping, wire brushing or sanding.
  - b.4 Treat surface with rust converter. Allow to stand overnight, then wipe off white residue with a clean rag soaked in solven.
  - b.5 Allow one (1) coat of Primer. Allow drying overnight before finishing with one or two coats of recommended topcoat.”
- c. For New Concrete and Masonry Painting
  - c.1 Surface to be painted must be allowed to dry for 14 to 28 days before neutralization.
  - c.2 Surface should be clean and dry, free from oil, grease, dust, dirt, contaminants and all loose grit or mortar.
  - c.3 Treat with Masonry Neutralizer.
  - c.4 Apply liberally by brush and let dry overnight.
  - c.5 Rinse with water to remove white crystals that form on the surface. Let dry.

d. For New Wood Painting

d.1 Surface must be clean and dry, free from dust, dirt and other foreign matter; sand rough edges remaining, countersink nail heads for putty application.

d.2 Dust off surface completely and wipe with a clean rag.

3.2 PAINTING

a. Mix paint with proper consistency. Stir paint thoroughly to keep pigment in even suspension when paint is being applied.

b. Unless otherwise indicated, apply paint in three coats (priming, body and finish) and allow each coat to dry thoroughly before next coat is applied (at least 48 hours between application of coats). Let Appointed Architect or his representative inspect each coat before proceeding work.

c. If at three coats the surface has not been satisfactorily finished, the Contractor shall apply the necessary number of coats to obtain desired evenness at no extra cost to the Project Proponent and/or Owner.

**09610 : RESILIENT SHEET FLOORING**

**PART 1- GENERAL**

**1.1 SCOPE**

- a. Furnish all materials and equipment and perform labor required to complete all resilient sheet flooring with integral cove base (height as indicated on plans).
- b. See drawings for details of Materials and Finishes.

**1.2 DELIVERY AND STORAGE**

- a. Deliver sheet flooring full width roll, completely enclosed in factory wrap, clearly marked with the manufacturer's number, type and color, production run number and manufacture date.
- b. Deliver other materials in original sealed packages or containers; labeled for identification with the manufacturer's name and brand.
- c. Store materials in weather tight and dry storage facility.
- d. Store sheet flooring on end.
- e. Protect from damage from handling, weather and construction operation before, during and after installation.

**1.3 MAINTENANCE TILE STOCK**

As an additional requirement during turnover and prior to Final Turnover, the Contractor will endorse to the Owner's Project Manager one (1) roll of each type/size/color and exact brand of vinyl sheets used within the Project with the end in view of providing stock which will flawlessly blend with the completed work in the event that the replacement of pieces should become necessary.

**1.4 SUBMITTALS**

- a. Manufacturers illustrated product literature and specifications.
  - a.1 Description of products provided.
  - a.2 Sheet flooring manufacturers' recommendations for adhesives, underlayment, and primers.
  - a.3 Application and installation instructions.
- b. Material Sample
  - b.1 Sheet material: 300 mm (12 inches) square for each type, pattern and color.
  - b.2 Edge strips: 150 mm (6 inches) long each type.
  - b.3 Adhesive, underlayment and primer: Pint container, each type.



## **PART 2 - PRODUCT**

### **2.1 VINYL SHEETS**

#### **a. FLEXIBLE HOMOGENEOUS FLOORING / PUR TREATED VINYL SHEETS**

GERFLOR brand or approved equal.

- 85% Vinyl sheets
- Shall be Antistatic, Anti-Bacterial and Fungicidal
- For heavy traffic areas like Corridors, Emergency rm., and general medical areas indicated on plans
- Shall be *Classic Imperial Type*; design and color are for Consultant's approval
- Use adhesive as per manufacturer's recommendation.

#### **b. CONDUCTIVE FLOORING VINYL SHEETS**

- Shall be Static Conductive, flexible homogeneous vinyl floor covering with an electrical resistance (carbon coated PVC pellets)
- Shall be Anti-Bacterial and Fungicidal
- For floor and wall as indicate on the plan
- The design and color are for Consultant's approval
- Use adhesive as per manufacturer's recommendation.
- Use adhesive as per manufacturer's recommendation.

### **2.2. ADHESIVES**

Water resistant type recommended by the sheet-flooring manufacturer for the conditions of use.

### **2.3. BASE CAP STRIP AND COVE STRIP**

- a. Extruded vinyl compatible with the sheet flooring.
- b. Cap strip "J" shape with feathered edge flange approximately 25 mm (one inch) wide; top designed to receive sheet flooring with 13 mm (1/2 inch) flange lapping top of flooring.
- c. Cove strip 70 mm (2-3/4 inch) radius.

### **2.4. LEVELING COMPOUND (For Concrete Floors)**

Provide cementitious products with latex or polyvinyl acetate resins in the mix.

### **2.4. PRIMER (For Concrete Subfloors)**

As recommended by the adhesive or sheet flooring manufacturer.

### **2.5. EDGE STRIPS**

- a. Extruded aluminum, mill finish, mechanically cleaned.

- b. 28 mm (1-1/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.
- c. Drill and counter sink edge strips for flat head screws. Space holes near ends and approximately 225 mm (9 inches) on center in between.

## 2.7 SEALANT

- a. As specified in Section, SEALANTS AND CAULKING.
- b. Compatible with sheet flooring.

## PART 3 - EXECUTION

### 3.1 PROJECT CONDITIONS

- a. Maintain temperature of sheet flooring above 36 °C (65 °F), for 48 hours before installation.
- b. Maintain temperature of rooms where sheet flooring work occurs above 36 °C (65 °F), for 48 hours, before installation and during installation.
- c. After installation, maintain temperature at or above 36 °C (65 °F).
- d. Building is permanently enclosed.
- e. Wet construction in or near areas to receive sheet flooring is complete, dry and cured.

### 3.2 SUBFLOOR PREPARATION

- a. The subfloor must be absolutely hard, level, dry, smooth, and structurally sound.
- b. The subfloor must be free of cracks and other irregularities and must not be contaminated with paint, plaster, oil, grease or any other substance, which could affect adhesion.
- c. Cracks must be filled with appropriate material.
- d. Determine adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI Technical Manual, Recommended Installation Practice for Homogenous Sheet Flooring, Fully Adhered.
- e. Prime concrete subfloor if priming is recommended by adhesive manufacturer.

### 3.3 INSTALLATION

- a. Follow sheet-flooring manufacturer's instructions for installation for obtaining the specified results.
- b. Install sheet in full coverage adhesives
  - b.1. Air pockets or loose edges will not be accepted.

- b.2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.
- c. Keep joints to a minimum; avoid small filler pieces or strips.
- d. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.
- e. Follow manufacturer's recommendations regarding pattern match, if applicable.
- f. Installation of Edge Strips:
  - f.1 Locate edge strips under center lines of doors unless otherwise indicated.
  - f.2 Set aluminum strips in adhesive, anchor with lead anchors and stainless steel Phillips screws.
- g. Integral Cove Base Installation:
  - g.1. Set preformed fillet strip to receive base.
  - g.2. Install the base with adhesive, terminate expose edge with the cap strip.
  - g.3. Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
  - g.4. Solvent weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.

Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces. Provide sheet flooring and base scheduled for room on floors and walls under and behind areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

### 3.4 CLEANING

- a. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.
- b. Keep traffic off sheet flooring for 24 hours after installation.
- c. Clean and polish materials per flooring manufacturer's written recommendations.
- d. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until the Resident Engineer authorizes removal.
- e. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

# *Technical Specifications*

# SPECIALTIES

**10440 : INTERIOR SIGNAGES**

**PART 1 - GENERAL**

**1.1 SCOPE**

This section specifies interior signage for room numbers, directional signs, directories, code required signs, telephone identification signs and temporary interior signs.

**1.2 MANUFACTURER'S QUALIFICATIONS**

a. Sign manufacturer shall provide evidence that they regularly and presently manufactures signs similar to those specified in this section as one of their principal products.

**1.3 SUBMITTALS**

- a. Submit in accordance with Section 01300, SAMPLES AND SHOP DRAWINGS.
- b. Samples: Sign panels and frames, with letters and symbols, each type.
- c. Manufacturer's Literature: Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
- d. Samples: Sign location plans, showing location, type and total number of signs required.

**1.4 DELIVERY AND STORAGE**

Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.

**1.5 COLORS AND FINISHES:**

Refer to Architectural drawings for location and extent of work required.

**PART 2 - PRODUCTS**

To be approved by the Consultant

**10800 : TOILET ACCESSORIES****PART 1 - GENERAL****1.1 SCOPE**

- a. Furnish materials and equipment and perform labor required to complete toilet and bath accessories. See drawings and details for sizes, location, extent and other requirements.

**1.2 SUBMITTALS**

- a. Submit in accordance with Section 01300, SAMPLES AND SHOP DRAWINGS.
- b. Shop Drawings:
  - b.1. Paper towel dispenser and combination dispenser and disposal units.
- c. Samples:
  - c.1. One of each type of accessory specified.
  - c.2. After approval, samples may be used in the work.
- d. Manufacturer's Literature and Data:
  - d.1. All accessories specified.
  - d.2. Show type of material, gauges or metal thickness in inches, finishes, and when required, capacity of accessories.
  - d.3. Show working operations of spindle for toilet tissue dispensers.

**1.3 QUALITY ASSURANCE**

- a. Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- b. Each accessory type shall be the same and be made by the same manufacturer.
- c. Each accessory shall be assembled to the greatest extent possible before delivery to the site.
- d. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.
- e. Each mirror shall bear manufacturer's label identifying type, thickness and quality.

**1.4 PACKAGING AND DELIVERY**

- a. Pack accessories individually to protect finish.
- b. Deliver accessories to the project only when installation work in rooms is ready to receive them.
- c. Deliver inserts and rough-in frames to site at appropriate time for building-in.

## **PART 2 - PRODUCTS**

### **2.1 TOILET ACCESSORIES**

- a. Tissue Dispensers: Shelf-type, double-roll dispenser with shelf and ashtray, raised apron at rear. Rolled front edge and return bend on sides. Spring clip shall secure ashtray.

### **2.3 FABRICATION**

- a. Shop Finishes: Metal shall be polished chrome or stainless steel.

### **2.4 LOCATION**

Refer to Architectural plans and drawings.

### **2.5 BRANDS/MANUFACTURERS**

approved by the Architect.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

Verification of Conditions: Verify that interior finishes in affected rooms have been applied and approved prior to installing equipment. Verify that necessary mounting materials are present in such quantity as to provide complete individual installations.

### **3.2 INSTALLATION**

Glass Mirrors: Cover edges of mirror with masking or friction tape prior to insertion in frame. Optional frame and attachment method may be a continuous clip member at top and bottom, fastened to wall, engaging fins on back of frame.

# *Technical Specifications*

# FURNISHING EQUIPMENT



**12100 : LOCATION SPECIFIED IN THE PLANS**

**PART 1 - GENERAL**

**1.1 SCOPE**

- a. This section specifies office, waiting area and nurse station chairs other location Specified in plan
- b. See drawings and details for sizes, location, extent and other requirements.

**1.2 DELIVERY AND STORAGE**

- a. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
- b. Protect from damage from handling and construction operations before, during and after installation.
- c. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

**1.3 SUBMITTALS**

- a. Submit in accordance with Section 01300, SAMPLES AND SHOP DRAWINGS.
- b. Shop Drawings:
  - b.1. Gang Chairs
  - b.2. station Chairs.
  - b.3. Other Location Specified in the Plan
- c. Samples:
  - c.1. One of each type of accessory specified.
  - c.2. After approval, samples may be used in the work.
- d. Manufacturer's Literature and Data:
  - d.1. All accessories specified.
  - d.2. Show type of material, gauges or metal thickness in inches, finishes, and when required, capacity of accessories.

## **PART 2 - PRODUCTS**

### **2.1 TECHNICAL SPECIFICATIONS**

1. To be approved by the Client or the Consultant

### **2.2 QUALITY ASSURANCE**

- a. Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- b. Each accessory type shall be the same and be made by the same manufacturer.
- c. Each accessory shall be assembled to the greatest extent possible before delivery to the site.
- d. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.
- e. Each mirror shall bear manufacturer's label identifying type, thickness and quality.

### **2.3 PACKAGING AND DELIVERY**

- a. Pack accessories individually to protect finish.
- b. Deliver accessories to the project only when installation work in rooms is ready to receive them.
- c. Deliver inserts and rough-in frames to site at appropriate time for building-in.

### **2.4 LOCATION**

Refer to Architectural plans and drawings.

### **2.5 BRANDS/MANUFACTURERS**

To be approved by Client or the Consultant

## **PART 3 - EXECUTION**

### 3.1.1 EXAMINATION

Verification of Conditions: Verify that interior finishes in affected rooms have been applied and approved prior to installing equipment. Verify that necessary mounting materials are present in such quantity as to provide complete individual installations.

### 3.2 PROTECTION OF WORK

Cover all equipment, devices and apparatus to protect against dirt, water, chemical or mechanical damage, both before and after installation. Any equipment, devices or apparatus damaged prior to practical completion of the work shall be restored to its original condition, or replaced

# *Technical Specifications*

# MECHANICAL

**DIVISION 15 : MECHANICAL**

**23 05 00 : COMMON WORK RESULT OF HVAC**

**PART 1 GENERAL**

**1.1 SUBMITTALS**

1. Shop drawings; submit drawings stamped and signed for approval by Owner's Representative.
2. Shop drawings to show:
  1. Mounting arrangements.
  2. Operating and maintenance clearances.
3. Shop drawings and product data accompanied by:
  1. Detailed drawings of bases, supports, and anchor bolts.
  2. Acoustical sound power data, where applicable.
  3. Points of operation on performance curves.
  4. Manufacturer to certify current model production.
  5. Certification of compliance to applicable codes. New codes not more than 6-months.
  6. Submit product brochures, performance curve, selection table highlight the selected model.
4. Closeout Submittals:
  1. Provide operation and maintenance data for incorporation into manual.
  2. Operation and maintenance manual approved by, and final copies deposited with, Owner's Representative before final inspection in hard bound.
  3. Operation data to include:
    1. Control schematics for systems including environmental controls.
    2. Description of systems and their controls.
    3. Description of operation of systems at various loads together with reset schedules and seasonal variances.
    4. Operation instruction for systems and component.
    5. Description of actions to be taken in event of equipment failure.
    6. Valves schedule and flow diagram.
    7. Colour coding chart.
  4. Maintenance data to include:
    1. Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    2. Data to include schedules of tasks, frequency, tools required and task time.

5. Performance data to include:
  1. Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
  2. Equipment performance verification test results.
  3. Special performance data as specified.
  4. Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
6. Approvals:
  1. Submit 2 copies of draft Operation and Maintenance Manual to Owner's Representative for approval. Submission of individual data will not be accepted unless directed by Owner's Representative.
  2. Make changes as required and re-submit as directed by Owner's Representative.
7. Additional data:
  1. Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
8. Site records:
  1. Owner's Representative will provide 1 set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
  2. Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
  3. Use different colour for each service.
  4. Make available for reference purposes and inspection.
9. As-built drawings:
  1. Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
  2. Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
  3. Submit to Owner's Representative for approval and make corrections as directed.
  4. Perform testing, adjusting and balancing for HVAC using as-built drawings.
  5. Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
10. Submit copies of as-built drawings for inclusion in final TAB report.

## 1.2 MAINTENANCE

1. Furnish spare parts in accordance with the list below as follows:
  1. One set of packing for each pump.
  2. One casing joint gasket for each size pump.
  3. One head gasket set for each heat exchanger.
  4. One glass for each gauge glass.
  5. One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
2. Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.
3. Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

## **PART 2 PRODUCTS**

### 2.1 MATERIALS

1. All materials used on this project shall be new and approved unless noted otherwise.

## **PART 3 EXECUTION**

### 3.1 PAINTING, REPAIRS AND RESTORATION

1. Do painting in accordance with Section 09 91 23 - Interior Painting.
2. Prime and touch up marred finished paintwork to match original.
3. Restore to new condition, finishes which have been damaged.

### 3.2 CLEANING

1. Clean interior and exterior of all systems including strainers. Protect open ends of ducts, diffusers, grilles and registers during construction to prevent ingress of dust and dirt into interior of ducts. If dust or dirt is detected prior to startup, vacuum interior of all ducts and air handling units. Prior to vacuuming use video camera to record condition of ductwork. Also use video camera to record condition of ducts after cleaning.

### 3.3 FIELD QUALITY CONTROL

1. Site Tests: conduct following tests in accordance with Section 23 05 93 – Testing, Adjusting and Balancing for HVAC.
  1. Submit tests as specified in other sections of this specification.

2. Manufacturer's Field Services:
  1. Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  3. Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

### 3.4 **DEMONSTRATION**

1. Owner's Representative will provide water and power for test purposes prior to acceptance. Contractor to supply labour, material, and instruments required for testing.
2. Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
3. Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
4. Instruction duration time requirements as specified in appropriate sections.
5. Owner's Representative may record these demonstrations on video tape for future reference.

### 3.5 **PROTECTION**

1. Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system

**END OF SECTION**



## Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

1. Section includes:
  1. Concrete housekeeping pads, hangers and supports for mechanical piping, ducting and equipment.

#### **1.2 REFERENCES**

1. American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
  1. ANSI/ASME B31.1, Power Piping, (SI Edition).
2. American Society for Testing and Materials (ASTM)
  1. ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.
  2. ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  3. ASTM A563, Specification for Carbon and Alloy Steel Nuts.
3. Factory Mutual (FM)
4. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  1. MSS SP-58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  2. ANSI/MSS SP-69, Pipe Hangers and Supports - Selection and Application.
  3. MSS SP-89, Pipe Hangers and Supports - Fabrication and Installation Practices.

#### **1.3 SYSTEM DESCRIPTION**

1. Design Requirements
  1. Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  2. Base maximum load ratings on allowable stresses prescribed by MSS SP58 or ASME B31.1.
  3. Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  4. Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
  5. Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP58.

2. Performance Requirements
  1. Design supports, platforms, catwalks, hangers, to withstand seismic events for location as per the National Building Code

#### **1.4 SUBMITTALS**

1. Shop drawings: submit drawings stamped and signed for approval by Owner's Representative.
2. Submit shop drawings and product data for following items:
  1. Bases, hangers and supports.
  2. Connections to equipment and structure.
  3. Structural assemblies.
3. Quality assurance submittals: submit following:
  1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  2. Instructions: submit manufacturer's installation instructions.  
.1Owner's Representative will make available 1 copy of systems supplier's installation instructions.
4. Closeout Submittals:
  1. Provide maintenance data for incorporation into manual.
  2. Submit as-built drawings signed by the Designer.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

1. Packing, shipping, handling and unloading:
  1. Deliver, store and handle materials in accordance with manufacturer's written instructions.

### **PART 2 PRODUCTS**

#### **2.1 GENERAL**

1. Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP-58 and SP-89.
2. Use components for intended design purpose only. Do not use for rigging or erection purposes.

## 2.2 PIPE HANGERS

1. Finishes:
  1. Pipe hangers and supports: galvanized painted with zinc-rich paint after manufacture.
  2. Use electro-plating galvanizing process or hot dipped galvanizing process.
  3. Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.
2. Upper attachment structural: Suspension from lower flange of I-Beam.
  1. Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.  
.1Rod: 9 mm UL listed, 13 mm FM approved.
  2. Cold piping NPS 2 1/2 or greater, hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed, FM approved where required to MSS-SP58 and MSS-SP69.
3. Upper attachment structural: Suspension from upper flange of I-Beam.
  1. Cold piping NPS 2 maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed FM approved where required to MSS SP69.
  2. Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed, FM approved where required.
4. Upper attachment to concrete.
  1. Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotter with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  2. Concrete inserts: wedge shaped body with knockout protector plate UL listed FM approved where required to MSS SP-69.
5. Shop and field-fabricated assemblies.
  1. Trapeze hanger assemblies: MSS SP-89.
  2. Steel brackets: MSS SP-89.
  3. Sway braces for seismic restraint systems: to MSS SP-89.
6. Hanger rods: threaded rod material to MSS SP-58.
  1. Ensure that hanger rods are subject to tensile loading only.
  2. Provide linkages where lateral or axial movement of pipework is anticipated.
  3. Do not use 22 mm or 28 mm rod.
7. Pipe attachments: material to MSS SP-58.
  1. Attachments for steel piping: carbon steel galvanized.

2. Attachments for copper piping: copper plated black steel.
  3. Use insulation saddles for hot pipework.
  4. Oversize pipe hangers and supports for insulated pipes.
8. Adjustable clevis: material to MSS SP-69, UL listed FM approved, where required clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
    1. Ensure "U" has hole in bottom for rivetting to insulation shields.
  9. Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP-69.
  10. U-bolts: carbon steel to MSS SP-69 with 2 nuts at each end to ASTM A563.
    1. Finishes for steel pipework: galvanized.
    2. Finishes for copper, glass, brass or aluminum pipework: black with formed portion plastic coated or epoxy coated.
  11. Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP-69.

### **2.3 RISER CLAMPS**

1. Steel or cast iron pipe: galvanized black carbon steel to MSS SP-58, type 42, UL listed FM approved where required.
2. Copper pipe: carbon steel copper plated to MSS SP-58, type 42.
3. Bolts: to ASTM A307.
4. Nuts: to ASTM A563.

### **2.4 INSULATION PROTECTION SHIELDS**

1. Insulated cold piping:
  1. 64 kg/m<sup>3</sup> density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
2. Insulated hot piping:
  1. Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP-69.

### **2.5 CONSTANT SUPPORT SPRING HANGERS**

1. Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report(CMTR).
2. Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.
3. Provide upper and lower factory set travel stops.

4. Provide load adjustment scale for field adjustments.
5. Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.
6. Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

## **2.6 VARIABLE SUPPORT SPRING HANGERS**

1. Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.
2. Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.
3. Variable spring hanger to be complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.
4. Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

## **2.7 EQUIPMENT SUPPORTS**

1. Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

## **2.8 EQUIPMENT ANCHOR BOLTS AND TEMPLATES**

1. Provide templates to ensure accurate location of anchor bolts.

## **2.9 PLATFORMS AND CATWALKS**

1. To Section 05 50 00 - Metal Fabrication.

## **2.10 HOUSE-KEEPING PADS**

1. For base-mounted equipment: Concrete, at least 100 mm high, 50 mm larger all around than equipment, and with chamfered edges.
2. Concrete: to Section 03 30 00 - Cast-in-place Concrete by Division 3.

## **2.11 OTHER EQUIPMENT SUPPORTS**

1. From structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings.
2. Submit structural calculations with shop drawings.

## **PART 3 EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2 INSTALLATION**

1. Install in accordance with:
  1. Manufacturer's instructions and recommendations.
2. Vibration Control Devices:
  1. Install on piping systems at pumps, boilers, chillers, cooling towers, elsewhere as indicated.
3. Clamps on riser piping:
  1. Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
  2. Bolt-tightening torques to be to industry standards.
  3. Steel pipes: Install below coupling or shear lugs welded to pipe.
  4. Cast iron pipes: Install below joint.
4. Clevis plates:
  1. Attach to concrete with 4 minimum concrete inserts, one at each corner.
5. Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
6. Use approved constant support type hangers where:
  1. vertical movement of pipework is 13 mm or more,
  2. transfer of load to adjacent hangers or connected equipment is not permitted.
7. Use variable support spring hangers where:
  1. transfer of load to adjacent piping or to connected equipment is not critical.
  2. variation in supporting effect does not exceed 25 % of total load.

### **3.3 HANGER SPACING**

1. Plumbing piping: most stringent requirements of Canadian Plumbing Code
2. Fire protection: to applicable fire code.

3. Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.
4. Copper piping: up to NPS 1/2: every 1.5 m.
5. Hydronic, steam, condensate, rigid, and flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

Maximum Pipe Size: NPS	Maximum Spacing: Steel	Maximum Spacing: Copper
up to 1-1/4	2.1 m	1.8 m
1-1/2	2.7 m	2.4 m
2	3.0 m	2.7 m
2-1/2	3.6 m	3.0 m
3	3.6 m	3.0 m
3-1/2	3.9 m	3.3 m
4	4.2 m	3.6 m
5	4.8 m	
6	5.1 m	
8	5.7 m	
10	6.6 m	
12	6.9 m	

6. Within 300 mm of each elbow.
7. Pipework greater than NPS 12: to MSS SP69.

### 3.4 HANGER INSTALLATION

1. Install hanger so that rod is vertical under operating conditions.
2. Adjust hangers to equalize load.
3. Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members, comprised of angel iron or c-channel.

### 3.5 HORIZONTAL MOVEMENT

1. Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
2. Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

### 3.6 FINAL ADJUSTMENT

1. Adjust hangers and supports:

1. Ensure that rod is vertical under operating conditions.
2. Equalize loads.
2. Adjustable clevis:
  1. Tighten hanger load nut securely to ensure proper hanger performance.
  2. Tighten upper nut after adjustment.
3. C-clamps:
  1. Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
4. Beam clamps:
  1. Hammer jaw firmly against underside of beam.

**END OF SECTION**



## Section 23 05 93 – Testing, Adjusting and Balancing for HVAC

### PART 1 GENERAL

#### 1.1 SUMMARY

1. TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
2. TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this Section.

#### 1.2 QUALIFICATIONS OF TAB PERSONNEL

1. Submit names of personnel certified to AABC, NEBB or SMACNA to perform TAB to Owner's Representative within 90 days of award of contract.
2. Provide documentation confirming qualifications, successful experience. TAB contractor shall have a minimum of 5 (five) years experience to AABC, NEBB or SMACNA.
3. TAB: performed in accordance with the requirements of standard under which TAB  
Firm's qualifications are approved:
  1. Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
  2. National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
  3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems – Testing, Adjusting and Balancing.
4. Recommendations and suggested practices contained in the TAB Standard: mandatory.
5. Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
6. Use TAB standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
7. Where instrument manufacturer calibration recommendations are more stringent than those listed in the TAB standard, use manufacturer's recommendations.
8. TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
  1. For systems or system components not covered in TAB standard, use TAB procedures developed by TAB Specialist.
  2. Where new procedures and requirements are applicable to Contract requirements have been published or adopted by body responsible

Standard used (AABC, NEBB, or SMACNA), requirements and recommendations contained in these procedures and requirements are mandatory.

### 1.3 **PURPOSE OF TAB**

1. Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads.
2. Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
3. Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

### 1.4 **EXCEPTIONS**

1. TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

### 1.5 **CO-ORDINATION**

1. Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.
2. Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

### 1.6 **PRE-TAB REVIEW**

1. Review contract documents before project construction is started and confirm in writing to Owner's Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
2. Review specified standards and report to Owner's Representative in writing all proposed procedures which vary from standard.
3. During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

### 1.7 **START-UP**

1. Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
2. Follow special start-up procedures specified elsewhere in other Divisions.

**1.8 OPERATION OF SYSTEMS DURING TAB**

1. Operate systems for length of time required for TAB and as required by Owner's Representative for verification of TAB reports.

**1.9 START OF TAB**

1. Notify Owner's Representative seven (7) working days prior to start of TAB.
2. Start TAB when building is essentially completed, including:
  1. Installation of ceilings, doors, windows, other construction affecting TAB.
  2. Application of weatherstripping, sealing, caulking.
  3. All pressure, leakage, other tests specified elsewhere in other Divisions.
  4. All provisions for TAB installed and operational.
3. Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  1. Proper thermal overload protection in place for electrical equipment.
  2. Air systems:
    1. Filters in place, clean.
    2. Duct systems clean.
    3. Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
    4. Correct fan rotation.
    5. Fire, smoke, volume control dampers installed and open.
    6. Coil fins combed, clean.
    7. Access doors, installed, closed.
    8. Outlets installed, volume control dampers open.
  3. Liquid systems:
    1. Flushed, filled, vented.
    2. Correct pump rotation.
    3. Strainers in place, baskets clean.
    4. Isolating and balancing valves installed, open.
    5. Calibrated balancing valves installed, at factory settings.
    6. Chemical treatment systems complete, operational.

**1.10 APPLICATION TOLERANCES**

1. Do TAB to following tolerances of design values:
  1. Laboratory HVAC systems: plus 10%, minus 0%.
  2. Other HVAC systems: plus 5%, minus 5%.
  3. Hydronic systems: plus or minus 10 %.

4. Refrigeration systems: plus or minus 10%.

#### 1.11 **ACCURACY TOLERANCES**

1. Measured values to be accurate to within plus or minus 2 % of actual values.

#### 1.12 **INSTRUMENTS**

1. Prior to TAB, submit to Owner's Representative list of instruments to be used together with serial numbers.
2. Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
3. Calibrate within 3 (three) months of TAB. Provide certificate of calibration to Owner's Representative.

#### 1.13 **SUBMITTALS**

1. Submit, prior to commencement of TAB:
2. Proposed methodology and procedures for performing TAB if different from referenced standard.

#### 1.14 **PRELIMINARY TAB REPORT**

1. Submit for checking and approval of Owner's Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  1. Details of instruments used.
  2. Details of TAB procedures employed.
  3. Calculations procedures.
  4. Summaries.

#### 1.15 **TAB REPORT**

1. Format to be in accordance with referenced standard.
2. TAB report to show results in SI units and to include:
  1. Project record drawings.
  2. System schematics.
3. Submit 3 (three) copies of TAB Report to Owner's Representative for verification and approval, in English in D-ring binders, complete with index tabs.

#### 1.16 **VERIFICATION**

1. Reported results subject to verification by Owner's Representative.

2. Provide manpower and instrumentation to verify up to 30% of reported results.
3. Number and location of verified results to be at discretion of Owner's Representative.
4. Bear costs to repeat TAB as required to satisfaction of Owner's Representative.

#### 1.17 **SETTINGS**

1. After TAB is completed to satisfaction of Owner's Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
2. Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

#### 1.18 **COMPLETION OF TAB**

1. TAB to be considered complete when final TAB Report received and approved by Owner's Representative.

#### 1.19 **AIR SYSTEMS**

1. Standard: TAB to be to most stringent of this section or TAB standards of AABC or NEBB.
2. Do TAB of systems, equipment, components, controls specified in other Divisions.
3. Qualifications: personnel performing TAB to be qualified to standards of AABC or NEBB.
4. Quality assurance: Perform TAB under direction of supervisor qualified to standards of AABC or NEBB.
5. Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration, amperage and volts for each stage of electrical heating coils.
6. Locations of equipment measurements: To include, but not be limited to, following as appropriate:
  1. Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.
  2. At controllers, controlled device.
7. Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

**1.20 OTHER TAB REQUIREMENTS**

1. General requirements applicable to work specified this paragraph:
  1. Qualifications of TAB personnel: as for air systems specified this section.
  2. Quality assurance: as for air systems specified this section.
2. Laboratory fume hoods:
  1. Standard: ASHRAE 110 – Method of Testing Performance of Laboratory Fume Hoods, applicable provincial standard.
  2. TAB procedures: as described in standard.
3. Building pressure conditions:
  1. Adjust HVAC systems, equipment, controls to ensure specified pressure conditions during winter and summer design conditions.
4. Zone pressure differences:
  1. Adjust HVAC systems, equipment, controls to establish specified air pressure differentials, with all systems in all possible combinations of normal operating modes.
5. Smoke management systems:
  1. Test for proper operation of all smoke and fire dampers, sensors, detectors, installed as component parts of air systems specified in other Divisions.
6. Measurement of noise and vibration from equipment specified in Mechanical Division.
  1. Standard: 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment and 23 32 48 – Acoustical Air Plenums.
  2. Vibration measurements around each piece of rotating equipment.
  3. Sound measurements in each octave band around each piece of rotating equipment.
  4. Induct sound measurements in each octave band at each fan inlet and discharge.
  5. Induct sound measurements in each octave band at each air handling unit intake, return and discharge.
  6. Sound measurements in each octave band for each normally occupied room with air handling equipment running.
7. Measurement of spatial noise:
  1. Standard: Section 23 32 48 – Acoustical Air Plenums.

**1.21 POST- OCCUPANCY TAB**

1. Measure DBT, WBT (or %RH), air velocity, air flow patterns, NC levels, in occupied zone of areas designated by Owner's Representative.

2. Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 3 months of termination of Warranty Period.

**END OF SECTION**

1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

2. American Society for Testing and Materials International, (ASTM)

ASTM B209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).

ASTM C335, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

ASTM C411, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

ASTM C547, Specification for Mineral Fiber Pipe Insulation.

ASTM C553, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

ASTM C612, Specification for Mineral Fiber Block and Board Thermal Insulation.

ASTM C795, Specification for Thermal Insulation for Use with Austenitic Stainless Steel.

ASTM C921, Standard Practice for Determining Properties of Jacketing Materials for Thermal Insulation.

## 1.2 DEFINITIONS

1. For purposes of this section:

"CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

"EXPOSED" - will mean "not concealed" as defined herein.

Insulation systems - insulation material, fasteners, jackets, and other accessories.

## 1.3 SHOP DRAWINGS

1. Submit shop drawings.
2. Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

## 1.4 SAMPLES



1. Submit samples for selected insulation.
2. Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix typewritten label beneath sample indicating service.

### **1.5 MANUFACTURERS' INSTRUCTIONS**

1. Submit manufacturer's installation instructions.
2. Installation instructions to include procedures used and installation standards achieved.

### **1.6 QUALIFICATIONS**

1. Installer: certified in performing work of this section, and have at least 5 years successful experience in this size and type of project, qualified to standards of TIAC.

### **1.7 DELIVERY, STORAGE AND HANDLING**

1. Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
2. Protect from weather and construction traffic.
3. Protect against damage from any source.
4. Store at temperatures and conditions recommended by manufacturer.

### **1.8 WASTE MANAGEMENT AND DISPOSAL**

1. Separate and recycle waste materials.
2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
3. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
4. Divert unused metal materials from landfill to metal recycling facility approved by Owner's Representative.
5. Divert unused adhesive material from landfill to official hazardous material collections site approved by Owner's Representative.
6. Do not dispose of unused adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

## **PART :      PRODUCTS**

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## **PART 2 PRODUCTS**

### **2.1 FIRE AND SMOKE RATING**

1. In accordance with CAN/ULC-S102  
  
Maximum flame spread rating : 25.  
Maximum smoke developed rating : 50

### **2.2 INSULATION**

1. Duct Insulation Thermal Conductivity: 0.044 W/m °K
2. Duct Nominal Density: 32 kg/m<sup>3</sup>
3. Duct Thickness: 25mm thick
4. Duct Type: Fiberglass Insulation

### **2.3 JACKETS**

1. Canvas: 220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
2. Lagging adhesive: Compatible with insulation.
3. Aluminum:  
  
To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.  
Thickness: 0.40 mm sheet.  
Finish: Stucco embossed or corrugated.  
Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.
4. Stainless steel:  
  
Type: 304 or 316 where additional corrosion protection is required.  
Thickness: 0.25 mm sheet.  
Finish: Corrugated or stucco embossed.  
Jacket banding and mechanical seals: 12mm wide, 0.5 mm thick stainless steel.

### **2.4 ACCESSORIES**

1. Vapour retarder lap adhesive:  
  
Water based, fire retardant type, compatible with insulation.
2. Indoor Vapour Retarder Finish:  
  
Vinyl emulsion type acrylic, compatible with insulation.
3. **Insulating Cement: hydraulic setting on mineral wool, to ASTM C449**

4. Canvas Jacket:  
220 gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
5. Outdoor Vapour Retarder Mastic:
6. Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.
7. Contact adhesive: quick-setting
8. Canvas adhesive: washable.
9. Tie wire: 1.5 mm stainless steel.
10. Banding: 12 mm wide, 0.5 mm thick stainless steel.
11. Facing: 25 mm galvanized steel hexagonal wire mesh stitched on one face of insulation.
12. Fasteners: 4 mm diameter pins with 35 mm diameter or square clips, length to suit thickness of insulation.

### **PART 3      EXECUTION**

#### **3.1 PRE-INSTALLATION REQUIREMENTS**

1. Pressure testing of ductwork systems complete, witnessed and certified.
2. Surfaces clean, dry, free from foreign material.

#### **3.2 INSTALLATION**

1. Install in accordance with PSME Standards.
2. Apply materials in accordance with manufacturer's instructions and as indicated.
3. Use two layers with staggered joints when required nominal thickness exceeds 75 mm.
4. Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
5. Supports, Hangers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment  
  
Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
6. Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

#### **3.3 DUCTWORK INSULATION SCHEDULE**

1. Insulation types and thicknesses: Conform to following Table:

	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts (exposed)	yes	50
Rectangular cold and dual temperature supply air ducts (concealed)	Yes	25
Outside air ducts to mixing plenum	yes	50
Mixing plenums	yes	25
Exhaust duct between dampers and louvers	no	50
Acoustically lined ducts	See Section 23 33 53- Duct Liners	

2. Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

## END OF SECTION

### 1.2 RELATED SECTIONS

1. Section 23 07 16 – HVAC Equipment Insulation.
2. Section 23 05 53.01 – Mechanical Identification.

### 1.3 REFERENCES

1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  1. ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including all Addenda).
2. American Society for Testing and Materials (ASTM)
  1. ASTM B209M, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
  2. ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
  3. ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
  4. ASTM C449/C449M, Standard Specification for Mineral Fibre-Hydraulic-Setting Thermal Insulating and Finishing Cement.
  5. ASTM C533 Standard specification for Calcium Silicate Insulation Block and Pipe.
  6. ASTM C547 Standard Specification for Mineral Fibre Pipe Insulation.
  7. ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
  8. ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
  9. ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

### 1.4 DEFINITIONS

1. For purposes of this section:
  1. "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
  2. "EXPOSED" - will mean "not concealed" as defined herein.

### 1.5 SUBMITTALS

1. Product Data:
  1. Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
    1. Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

2. Shop Drawings:
  1. Submit shop drawings.
3. Samples:
  1. Submit samples - Submittal Procedures.
  2. Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.
4. Quality assurance submittals: submit the following.
  1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  2. Instructions: submit manufacturer's installation instructions to Owner's Representative.

## **1.6 QUALITY ASSURANCE**

1. Qualifications:
  1. Installer: certified in performing work of this Section, and have at least 5 years successful experience in this size and type of project, qualified to standards of ASHRAE.

## **1.7 DELIVERY, STORAGE AND HANDLING**

1. Packing, shipping, handling and unloading:
  1. Deliver, store and handle in accordance with manufacturer's written instructions.
  2. Deliver, store and handle materials in accordance with manufacturer's written instructions.
  3. Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
2. Storage and Protection:
  4. Protect from weather, construction traffic.
  5. Protect against damage.
  6. Store at temperatures and conditions required by manufacturer.

## **PART 2                    PRODUCTS**

### **2.1 FIRE AND SMOKE RATING**

1. In accordance with CAN/ULC-S102.
  1. Maximum flame spread rating: 25.
  2. Maximum smoke developed rating: 50.

### **2.2 INSULATION**

1. Mineral fibre specified includes glass fibre, rock wool, slag wool.
2. Thermal conductivity ("k" factor) not to exceed specified values at 24 °C mean temperature when tested in accordance with ASTM C335.
3. Rubber Insulation Armaflex Class "O" for piping.
4. Insulation Thermal Conductivity: 0.034 W/m °K
5. Nominal Density: 32 kg/m<sup>3</sup>
6. Thickness: 25mm thick
7. Type of Insulation : Armaflex Rubber Insulation Class 0

### **2.3 INSULATION SECUREMENT**

1. Tape: Self-adhesive, aluminum, plain reinforced, 50 mm wide minimum.
2. Contact adhesive: Quick setting.
3. Canvas adhesive: Washable.
4. Tie wire: 1.5 mm diameter stainless steel.
5. Bands: Stainless steel, 19 mm wide, 0.5 mm thick.

### **2.4 CEMENT**

1. Thermal insulating and finishing cement:
  1. Hydraulic setting or air drying on mineral wool, to ASTM C449/C449M.

### **2.5 VAPOUR RETARDER LAP ADHESIVE**

1. Water based, fire retardant type, compatible with insulation.

### **2.6 INDOOR VAPOUR RETARDER FINISH**

1. Vinyl emulsion type acrylic, compatible with insulation.

## 2.7 OUTDOOR VAPOUR RETARDER FINISH

1. Vinyl emulsion type acrylic, compatible with insulation.
2. Reinforcing fabric: Fibrous glass, untreated 305 g/m<sup>2</sup>.

## 2.8 JACKETS

1. Polyvinyl Chloride (PVC):
  1. One-piece moulded type and sheet to ASTM D1784 with pre-formed shapes as required.
  2. Colours: to match adjacent finish paint. Confirm colour with Owner's Representative.
  3. Minimum service temperatures: -20°C.
  4. Maximum service temperature: 65°C.
  5. Moisture vapour transmission: 0.02 perm.
  6. Thickness: 0.55 mm.
  7. Fastenings:
    1. Use solvent weld adhesive compatible with insulation to seal laps and joints.
    2. Tacks.
    3. Pressure sensitive vinyl tape of matching colour.
  8. Special requirements:
    1. Indoor: flame spread rating 25, smoke developed rating 50.
    2. Outdoor: UV rated material at least 0.5 mm thick.
2. Canvas:
  1. 220gm/m<sup>2</sup> cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
  2. Lagging adhesive: Compatible with insulation.
3. Aluminum:
  1. To ASTM B209.
  2. Thickness: 0.50 mm sheet.
  3. Finish: Embossed or corrugated.
  4. Joining: Longitudinal and circumferential slip joints with 50 mm laps.
  5. Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
  6. Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.



4. Stainless steel:
  1. Type: 304 or type 316.
  2. Thickness: 0.25 mm.
  3. Finish: Smooth.
  4. Joining: Longitudinal and circumferential slip joints with 50 mm laps.
  5. Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
  6. Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

## **2.9 WEATHERPROOF CAULKING FOR JACKETS INSTALLED OUTDOORS**

1. Caulking to: Section 07 92 00 - Joint Sealing.

## **PART 3**

### **EXECUTION**

#### **3.1 MANUFACTURE'S INSTRUCTIONS**

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **3.2 PRE- INSTALLATION REQUIREMENT**

1. Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
2. Surfaces to be clean, dry, free from foreign material.

#### **3.3 INSTALLATION**

1. Install in accordance with TIAC National Standards.
2. Apply materials in accordance with manufacturers instructions and this specification.
3. Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
4. Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
  1. Install hangers, supports outside vapour retarder jacket.
5. Supports, Hangers:
  1. Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

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### **3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES**

1. See Section 23 07 16 – HVAC Equipment Insulation.

### **3.5 INSTALLATION OF ELASTOMERIC INSULATION**

1. Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
2. Provide vapour retarder as recommended by manufacturer.

### **3.6 CLEANING**

1. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## Section 232300 – Refrigerant Piping

### PART 1 – GENERAL

#### 1.1 SUMMARY

1. Section Includes:
  1. Materials and installation for copper tubing and fittings for refrigerant.

#### 1.2 RELATED SECTIONS:

1. Section 23 05 05 - Installation of Pipework.

#### 1.3 REFERENCES

1. American Society of Mechanical Engineers (ASME)
  1. ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
  2. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60,000 PSI Tensile Strength.
  3. ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
  4. ASME B31.5, Refrigeration Piping and Heat Transfer Components.
2. American Society for Testing and Materials (ASTM)
  1. ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  2. ASTM B 280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

#### 1.4 SUBMITTALS

1. Submittals.
2. Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
3. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
4. Instructions: submit manufacturer's installation instructions.
5. Closeout submittals: submit maintenance and engineering data for incorporation into manual specified.

## **1.5 QUALITY ASSURANCE**

1. Pre-Installation Meeting:
  1. Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
    1. Verify project requirements.
    2. Review installation and substrate conditions.
    3. Co-ordination with other building subtrades.
    4. Review manufacturer's installation instructions and warranty requirements.
2. Health and Safety:
  1. Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
3. Trades people to be journeyperson and graduate from a recognized college refrigeration trade program.

## **1.6 DELIVERY, STORAGE AND HANDLING**

1. Waste Management and Disposal:
  1. Separate waste materials for reuse and recycling.
  2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
  3. Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
  4. Separate for reuse and recycling and place in designated containers, steel, metal, plastic waste in accordance with Waste Management Plan (WMP).
  5. Divert unused metal materials from landfill to metal recycling facility as approved by Owner's Representative

## **PART 2 PRODUCTS**

### **2.1 TUBINGS**

1. Processed for refrigeration installations, deoxidized, dehydrated and sealed.
  1. Hard copper: to ASTM B280, type ACR B (nitrogenized).
  2. Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

## 2.2 FITTINGS

1. Service: design pressure 2070 kPa and temperature 121°C.
2. Brazed:
  1. Fittings: wrought copper to ASME B16.22.
  2. Joints: silver solder, 45% Ag - 80% Cu - 5% P and non-corrosive flux for copper to steel or brass; Silfoss-15 for copper to copper.
3. Flanged:
  1. Bronze or brass, to ASME B16.24, Class 150 and Class 300, tongue and groove type.
  2. Gaskets: suitable for service.
  3. Bolts, nuts and washers: to ASTM A307, heavy series.
4. Flared:
  1. Bronze or brass, for refrigeration, to ASME B16.26.

## 2.3 PIPE SLEEVES

1. Hard copper or steel, sized to provide 6 mm clearance between sleeve and uninsulated pipe or between sleeve and insulation.

## 2.4 VALVES

1. 7/8 ODS and under: Class 500, 3.5 MPa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moistureproof seal for below freezing applications, brazed connections.
2. Over 7/8 ODS: Class 375, 3 MPa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and forged brass bonnet, moisture-proof seal  
for below freezing applications, brazed connections, non-rotating, self aligning swivel disc, Teflon seat, -40°C - 163°C.
3. Ball valves 7 3/8 ODS to 3 1/8 ODS: maximum WP 4MPa, -40°C to 149°C, live loaded stem seal, double "O" ring hermetically sealed body, blowout proof stem, seal cap "O" ring sealed, valve position indicators, forged brass body bonnet, brass cap, triple sealed plated steel item, Teflon ball seals and gasket, extended copper connections, helium leak test to maximum 0.28 g/yr.
4. Check valves 7/8 ODS to 3 1/8 ODS cast bronze body, brass bonnet, Teflon seat, internal  
parts removable minimum opening pressure 3.5 kPa, maximum WP 3.5 kPa - 29°C to 149°C, UL and CSA approved.
5. Check valves 3/8 ODS to 7/8 ODS: brass construction, Teflon seal, removable piston,  
maximum WP 3.5 kPa, -40°C to 149°C, suitable for high side, low side and hot gas. UL and CSA approved, maximum opening pressure 3.5 kPa.

## **PART 3            EXECUTION**

### **3.1                    MANUFACTURER'S INSTRUCTIONS**

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### **3.2                    GENERAL**

1. In accordance with Section 23 05 05 – Installation of Pipework, supplemented as specified herein.
2. Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5.

### **3.3                    BRAZING PROCEDURES**

1. Bleed inert gas into pipe during brazing.
2. Remove valve internal parts, solenoid valve coils, sight glass.
3. Do not apply heat near expansion valve and bulb.

### **3.4                    PIPING INSTALLATION**

1. General:
  1. Soft annealed copper tubing: bend without crimping or constriction, hard drawn copper tubing: do not bend. Minimize use of fittings.
  2. Hot gas lines:
    1. Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
    2. Provide trap at base of risers greater than 1800 mm high and at each 6000 mm thereafter.
    3. Provide inverted deep trap at top of risers.
    4. Provide double risers for compressors having capacity modulation.
      1. Large riser: install traps as specified above.
      2. Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

### **3.5                    PRESSURE AND LEAK TESTING**

1. Close valves on factory charged equipment and other equipment not designed for test pressures.
2. Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.

3. Test Procedure: Build pressure up to 35 kPa using nitrogen leave for 8 hours.

### 3.6 FIELD QUALITY CONTROL

1. Site Tests/Inspection
  1. Close service valves on factory charged equipment.
2. Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.
3. Use copper lines for largest practical size to reduce evacuation time.
4. Use two-stage vacuum pump with gas ballast on 2<sup>nd</sup> stage capable of pulling 5 Pa absolute and filled with dehydrated oil.
5. Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
6. Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
  1. Twice to 14 Pa absolute and hold for 4 h.
  2. Break vacuum with refrigerant to 14 KPa.
  3. Final to 5 Pa absolute and hold for at least 12 h.
  4. Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
7. Charging:
  1. Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
  2. With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
  3. Re-purge charging line if refrigerant container is changed during charging process.
8. Checks:
  1. Make checks and measurements as per manufacturer's operation and maintenance instructions.
  2. Record and report measurements to Owner's Representative.
9. Manufacturer's Field Services:
  1. Have manufacturer of products, supplied under this Section, review work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify

- compliance of work with Contract.
2. Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  3. Schedule site visits, to review work , at stages listed:
    1. After delivery and storage of products, and when preparatory work, or other work, on which the work of this Section depends, is complete but before installation begins.
    2. Twice during progress of work at 25% and 60% complete.
  4. Obtain reports, within three (3) working days of review, and submit, immediately, to Owner's Representative.

### **3.7 DEMONSTRATION**

1. Instructions:
  1. Post instructions in frame with glass cover in accordance with Section 01 78 00 – Closeout Submittals and CSA B52.
    1. Perform cleaning operations as specified in Section 01 74 11 – Cleaning and in accordance with manufacturer's recommendations.
    2. On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



## Section 23 31 13 – Metal Ducts

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

1. Section includes:
  1. Materials and installation of low-pressure metallic ductwork, joints and accessories.

#### **1.2 RELATED SECTIONS**

1. Section 01 33 00 – Submittal Procedures.
2. Section 01 35 29.06 – Health and Safety Requirements
3. Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
4. Section 01 91 13 – General Commissioning (Cx) Requirements.
5. Section 07 84 00 – Firestopping
6. Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.
7. Section 23 05 94 – Pressure Testing of Ducted Air Systems.
8. Section 23 44 00 – HVAC Air Filtration

#### **1.3 REFERENCES**

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
2. American Society for Testing and Materials International, (ASTM).
  1. ASTM A 480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  2. ASTM A635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.
  3. ASTM A 653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
3. Department of Justice Canada (Jus).
  1. Canadian Environmental Protection Act (CEPA).
4. Health Canada/Workplace Hazardous Materials Information System (WHMIS).

1. Material Safety Data Sheets (MSDS).
5. National Fire Protection Association (NFPA).
  1. NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  2. NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
  3. NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
6. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  1. SMACNA HVAC Duct Construction Standards - Metal and Flexible.
  2. SMACNA HVAC Air Duct Leakage Test Manual.
  3. IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.

#### **1.4 SUBMITTALS**

1. Submit shop drawings and product data.
2. Product Data: submit WHMIS MSDS - Material Safety Data for the following:
  1. Sealants.
  2. Tape.
  3. Proprietary Joints.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

1. Protect on site stored or installed absorptive material from moisture damage.

## **PART 2 PRODUCTS**

### **2.1 SEAL CLASSIFICATION**

1. Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
> 1000	A
750	B
500	C
250	C
125	C

2. Seal classification:

1. Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.
2. Class B: longitudinal seams, transverse joints and connections made airtight with sealant tape or combination thereof.
3. Class C: transverse joints and connections made air tight with gaskets, sealant tape or combination thereof. Longitudinal seams unsealed.

### **2.2 SEALANT**

1. Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C.

### **2.3 TAPE**

1. Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

### **2.4 DUCT LEAKAGE**

1. In accordance with SMACNA HVAC Duct Leakage Test Manual.

### **2.5 FITTINGS**

1. Fabrication: to SMACNA.
2. Radiused elbows:
  1. Rectangular: Centreline radius: 1.5 times width of duct.
  2. Round: smooth radius or five piece. Centreline radius: 1.5 times diameter.
3. Mitred elbows, rectangular:
  1. To 400 mm: with single thickness turning vanes.
  2. Over 400 mm: with double thickness turning vanes.
4. Branches:

1. Rectangular main and branch: with radius on branch 1.5 times width of duct or 45° entry on branch.
2. Round main and branch: enter main duct at 45° with conical connection.
3. Provide volume control damper in branch duct near connection to main duct.
4. Main duct branches: with volume control damper.
5. Transitions:
  1. Diverging: 20° maximum included angle.
  2. Converging: 30° maximum included angle.
6. Offsets:
  1. Full short radiused elbows as indicated.
7. Obstruction deflectors: maintain full cross-sectional area. Maximum included angles: as for transitions.

## **2.6 FIRESTOPPING**

1. Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 – Firestopping.
2. Firestopping material and installation must not distort duct.

## **2.7 GALVANIZED STEEL**

1. Lock forming quality: to ASTM A653, G90 zinc coating.
2. Thickness, fabrication and reinforcement: to SMACNA.
3. Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

## **2.8 ALUMINUM**

1. To SMACNA. Aluminum type: 3003-H-14.
2. Thickness, fabrication and reinforcement: to SMACNA.
3. Joints: to SMACNA and be continuous weld.

## **2.9 BLACK STEEL**

1. To ASTM A635/A635M.
2. Thickness: 1.2 mm
3. Fabrication: ducts and fittings or SMACNA.

4. Reinforcement: to SMACNA.
5. Joints: continuous weld.

## 2.10 KITCHEN EXHAUST SYSTEMS

1. Construct in accordance with NFPA 96.
2. Material: Type 304 stainless steel where exposed, stainless steel where concealed or black sheet where concealed.
3. Thickness: to NFPA 96.
4. Fabrication: joints, continuous inert gas welded for stainless steel, ARC welded for black steel.
5. Reinforcement: to SMACNA.
6. Drainage: at low point.
7. Grease filters: to Section 23 44 00 – HVAC Air Filtration.

## 2.11 HANGERS AND SUPPORTS

1. Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500 mm.
2. Hanger configuration: to SMACNA.
3. Hangers: galvanized steel angle with black steel rods to ASHRAE or SMACNA following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25x25x3	6
751 to 1050	40x40x3	6
1051 to 1500	40x40x3	10
1501 to 2100	50x50x3	10
2101 to 2400	50x50x5	10
2401 and over	50 x 50 x 6	10

4. Upper hanger attachments:
  1. For concrete: manufactured concrete inserts.
  2. For steel joist: manufactured joist clamp steel plate washer.
  3. For steel beams: manufactured beam clamps:

## **PART 3 EXECUTION**

### **3.1 GENERAL**

1. Do work in accordance with NFPA 90A, NFPA 90B, and SMACNA.
2. Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm beyond insulated duct.
3. Support risers in accordance with SMACNA.
4. Install breakaway joints in ductwork on sides of fire separation. Do not place fire stopping material in expansion space between damper sleeve and fire partition.
5. Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
6. Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

### **3.2 HANGERS**

1. Strap hangers: install in accordance with SMACNA.
2. Angle hangers: complete with locking nuts and washers.
3. Hanger spacing: in accordance with SMACNA or as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

### **3.3 WATERTIGHT DUCT**

1. Provide watertight duct for:
  1. Dishwasher exhaust.
  2. Fresh air intake.
  3. Minimum 3000 mm from duct mounted humidifier in all directions.
  4. As indicated.
2. Form bottom of horizontal duct without longitudinal seams. Solder or weld joints of bottom and side sheets. Seal other joints with duct sealer.
3. Slope horizontal branch ductwork down towards fume hoods served. Slope header ducts down toward risers.

4. Fit base of riser with 150 mm deep drain sump and NPS 1 ½ drain connected, with deep seal trap and valve and discharging to open funnel drain or service sink or as approved by Owner's Representative.

### **3.4 KITCHEN EXHAUST SYSTEMS**

1. Install to NFPA 96 and as indicated.

### **3.5 SEALING AND TAPING**

1. Apply sealant to outside of joint to manufacturer's recommendations.
2. Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations. Sealant and tape to be applied to full perimeter of duct.

### **3.6 LEAKAGE TESTS/COMMISSIONING**

1. Refer to Section 23 05 94 - Pressure Testing of Ducted Air Systems.
2. In accordance with SMACNA HVAC Duct Leakage Test Manual.
3. Do leakage tests in sections.
4. Make trial leakage tests as instructed to demonstrate workmanship.
5. Install no additional ductwork until trial test has been passed.
6. Test section minimum of 30 m long with not less than three branch takeoffs and two 90° elbows.
7. Complete test before insulation or concealment.

**END OF SECTION**

## Section 23 33 00 – Duct Accessories

### **PART 1            GENERAL**

#### **1.1                SUMMARY**

1. Section Includes:
  1. Materials and installation for duct accessories including flexible connections, access doors, vanes and collars.

#### **1.2                REFERENCES**

1. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  1. Material Safety Data Sheets (MSDS).
2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  1. SMACNA – HVAC Duct Construction Standards – Metal and Flexible.

#### **1.3                SUBMITTALS**

1. Submittals.
2. Product Data:
  1. Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
    1. Flexible connections
    2. Duct access doors.
    3. Turning vanes.
    4. Instrument test ports.
3. Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
  1. Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
4. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
5. Instructions: submit manufacturer's installation instructions.
6. Manufacturer's Field Reports: manufacturer's field reports specified.



**1.4 QUALITY ASSURANCE**

1. Pre-Installation Meetings:
  1. Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
    1. Verify project requirements.
    2. Review installation and substrate conditions.
    3. Co-ordination with other building subtrades.
    4. Review manufacturer's installation instructions and warranty requirements.

**1.5 DELIVERY, STORAGE AND HANDLING**

1. Waste Management and Disposal:
  1. Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
  2. Remove from site and dispose of packaging materials at appropriate recycling facilities.
  3. Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
  4. Separate for reuse and recycling and place in designated containers steel, metal, and plastic waste in accordance with Waste Management Plan (WMP).
  5. Divert unused metal materials from landfill to metal recycling facility as approved by Owner's Representative.

**PRODUCTS****1.6 GENERAL**

1. Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

**1.7 FLEXIBLE CONNECTIONS**

1. Frame: galvanized sheet metal frame 0.66 mm thick with fabric clenched by means of double locked seams.
2. Material:
  1. Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40<sup>0</sup>C to plus 90<sup>0</sup>C, density of 1.3 kg/m<sup>2</sup>.

**1.8 ACCESS DOORS IN DUCTS**

1. Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

2. Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
3. Gaskets: neoprene.

### **1.9 INSTRUMENT TEST PORTS**

1. 1.6 mm thick steel zinc plated after manufacture.
2. Cam lock handles with neoprene expansion plug and handle chain.
3. 28 mm minimum inside diameter. Length to suit insulation thickness.
4. Neoprene mounting gasket.

### **1.10 SPIN-IN COLLARS**

1. Conical galvanized sheet metal spin-in collars with lockable butterfly damper.
2. Sheet metal thickness to co-responding round duct standards.

## **PART 2**

### **EXECUTION MANUFACTURER'S INSTRUCTIONS**

#### **2.1**

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **2.2 INSTALLATION**

1. Flexible connections:
  1. Install in following locations:
    1. Inlets and outlets to supply air units and fans.
    2. Inlets and outlets of exhaust and return air fans.
    3. As indicated.
  2. Length of connection: 100 mm.
  3. Minimum distance between metal parts when system in operation: 75 mm.
  4. Install in accordance with recommendations of SMACNA.
  5. When fan is running:
    1. Ducting on sides of flexible connection to be in alignment.
    2. Ensure slack material in flexible connection.

2. Access doors and viewing panels:
  1. Size:
    1. 450 x 450 mm for servicing entry.
    2. 300 x 300 mm for viewing.
    3. As indicated.
  2. Locations:
    1. Fire and smoke dampers.
    2. Control dampers.
    3. Devices requiring maintenance.
    4. Required by code.
    5. Reheat coils.
    6. Elsewhere as indicated.
3. Instrument test ports.
  1. General:
    1. Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
  2. Locate to permit easy manipulation of instruments.
  3. Install insulation port extensions as required.
  4. Locations.
    1. For traverse readings:
      - .1 Ducted inlets to roof and wall exhausters.
      - .2 Inlets and outlets of other fan systems.
      - .3 Main and sub-main ducts.
      - .4 And as indicated.
    2. For temperature readings:
      - .1 At outside air intakes.
      - .2 In mixed air applications in locations as approved by Owner's Representative.
      - .3 At inlet and outlet of coils.
      - .4 Downstream of junctions of two converging air streams of different temperatures.
      - .5 And as indicated.

## **2.3 FIELD QUALITY CONTROL**

1. Manufacturer's Field Services:
  1. Have manufacturer's representative of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
  2. Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  3. Schedule site visits, to review Work, at stages listed:
    1. After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
    2. Twice during progress of Work at 25% and 60% complete.
    3. Upon completion of the Work, after cleaning is carried out.
  4. Obtain reports, within three (3) working days of review, and submit, immediately, to Owner's Representative.

## **2.4 CLEANING**

1. Perform cleaning operations in accordance with Manufacturer's recommendations.
2. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Section 23 34 00 – HVAC Fans****PART 1      GENERAL****1.1            SUMMARY**

1. Section Includes:
  1. Fans, motors, accessories, and hardware for commercial use.

**1.2            RELATED SECTIONS**

1. Section 23 05 13 – Common Motor Requirements for HVAC Equipment.
2. Section 23 05 48 – Vibration and Seismic Control for HVAC Piping and Equipment.
3. Section 23 33 00 – Air Duct Accessories.

**1.3            REFERENCES**

1. American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)
  1. ANSI/AMCA Standard 99, Standards Handbook.
  2. ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans.
  3. ANSI/AMCA Standard 301, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
2. American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
  1. ANSI/AMCA 210, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
3. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  1. AHSRAE 51, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  1. Material Safety Data Sheets (MSDS).
5. National Electrical Manufacturers Association (NEMA)
  1. NEMA MG 1 Motors and Generators
  2. NEMA ICS 7.1 Safety Standard for Construction and Guide for Selection, Installation and Operation of Adjustable Drive Systems.
6. The Master Painters Institute (MPI)

## 1.4 SYSTEM DESCRIPTION

1. Performance Requirements:
  1. Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.
  2. Capacity: flow rate, total static pressure, bhp W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.
  3. Fans: statically and dynamically balanced, constructed in conformity with AMCA
99.
  4. Sound ratings: comply with AMCA 301, tested to AMCA 300. Supply unit with AMCA certified sound rating seal.
  5. Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Supply unit with AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

## 1.5 SUBMITTALS

1. Product Data:
  1. Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
    1. Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
2. Shop Drawings:
  1. Submit shop drawings and product data.
3. Provide:
  1. Fan performance curves showing point of operation, BHP kW and efficiency.
  2. Sound rating data at point of operation.
  3. Dimensional data.
  4. Installation procedures.
4. Indicate:
  1. Motors, sheaves, bearings, shaft details
  2. Minimum performance achievable with variable speed controllers and variable inlet vanes as appropriate.
5. Quality assurance submittals:

1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  2. Instructions: submit manufacturer's installation instructions.
6. Closeout Submittals:
1. Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **1.6 QUALITY ASSURANCE**

1. Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

## **1.7 MAINTENANCE**

1. Extra Materials:
  1. Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
    1. Spare parts to include:
      1. Matched sets of belts.
  2. Furnish list of individual manufacturer's recommended spare parts for equipment, include:
    1. Bearings and seals.
    2. Belts
    3. Addresses of suppliers.
    4. List of specialized tools necessary for adjusting, repairing or replacing.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

1. Packing, shipping, handling and unloading:
  1. Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.
  2. Deliver, store and handle materials in accordance with manufacturer's written instructions.
2. Waste Management and Disposal:
  1. Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **PART 2            PRODUCTS**

### **2.1 FANS GENERAL**

1. Capacity: flow rate, static pressure, bhp, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

2. Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.
3. Sound ratings: comply with AMCA 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.
4. Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.
5. Motors:
  1. Open drip proof outside of air stream, TEFC when in air stream, explosion proof as indicated in accordance with NEMA MG1.
  2. In accordance with Section 23 05 13 – Common Motor Requirements for HVAC Equipment supplemented as specified herein.
  3. For use with variable speed controllers where specified.
  4. Sizes as specified.
  5. Two speed with two windings and speeds of approximately 1200 or 900 r/min low and 1800 r/min high as indicated.
  6. Two speeds with split winding, constant horsepower or constant or variable torque as specified and speeds as indicated.
6. Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards, fan inlet and/or outlet safety screens as indicated and as specified in Section 23 05 13 – Common Motor Requirements for HVAC Equipment, inlet or outlet dampers and vanes and as indicated.
7. Factory primed before assembly in colour standard to manufacturer.
8. Scroll casing drains: as indicated.
9. Finish on fume hood exhaust fans: heresite coated
10. Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.
11. Vibration isolation: to Section 23 05 48 - Vibration and Seismic Control for HVAC Piping and Equipment.
12. Flexible connections: to Section 23 33 00 – Air Duct Accessories.

## **2.2 CENTRIFUGAL FANS**

1. Fan wheels:
  1. Welded steel or aluminum construction.
  2. Maximum operating speed of centrifugal fans not more than 40 % of first critical speed.
  3. Air foil or backward inclined blades, as indicated.
2. Bearings: air handling quality, heavy duty, split pillow-block, flange mounted grease lubricated ball or roller self aligning type with oil retaining, dust



excluding seals and a certified minimum rated life to ABMA L10 of 100,000 hours. Shaft seals on laboratory fume hood and biological safety cabinet exhaust fans:

1. Single disc or stuffing box seals.
3. Housings:
  1. Volute with inlet cones: fabricated steel for wheels 300 mm or greater, cast iron, or steel, for smaller wheels, braced, and with welded supports.
  2. For horizontally and vertically split housings provide flanges on each section for bolting together, with gaskets of non-oxidizing non-flammable material.
  3. Provide bolted latched airtight access doors with handles.
  4. Spark resistant construction Type B minimum where indicated.
4. Variable volume control devices:
  1. Mounted by fan manufacturer.
  2. Adjustable inlet vanes: operated from a centre mechanism linked to each damper vane. Support each vane at ends in bronze bearings. On DWDI fans interconnect vanes to operate in unison. Provide locking devices for manual operation.
  3. Variable Speed Drives: to NEMA ICS 7.1.

### **2.3 CABINET FANS - GENERAL PURPOSE**

1. Fan characteristics and construction: as centrifugal fans.
2. Cabinet hung single or multiple wheels with DWDI centrifugal fans in factory fabricated casing complete with vibration isolators and seismic control measures, motor, direct drive or V-belt drive and guard outside casing.
3. Fabricate casing of zinc coated or phosphate treated steel reinforced and braced for rigidity. Provide removable panels for access to interior. Uncoated, steel parts shall be painted over with corrosion resistant paint to MPI #18. Finish inside and out, over prime coat, with rust resistant enamel to Section 09 91 13 – Exterior Painting. Internally line cabinet with 12-25 mm thick rigid acoustic insulation, pinned and cemented, complete with metal nosings on all exposed edges.

### **2.4 UTILITY SETS**

1. Characteristics and construction: for centrifugal fans.
2. Preassemble single width centrifugal fan with removable protective hood with vents, and automatic spring loaded back draft dampers and 12 mm mesh birdscreens where indicated.

3. Provide belt driven sets with adjustable motor bed plate and variable pitch driver sheave.

## **2.5 AXIAL FLOW FANS (TUBE-AXIAL OR VANE-AXIAL)**

1. Casings: welded steel with welded motor support, hinged or bolted access plates, streamlined inlet cone and discharge bell sections.
2. Blade material: steel or aluminum. Hub material: steel or aluminum.
3. Supports:
  1. Floor mounted units: reinforced legs.
  2. Ceiling suspended units: support brackets welded to side of casing. Extend grease lubrication facilities to outside of casing.
4. Bearings: ball or roller with extension tubes to outside of casing.
5. Direct drive:
  1. Adjustable or fixed blade wheels as indicated: totally-enclosed, air over motors.
  2. Diameter of wheel hub: at least equal to that of motor frame.
  3. Adjustable blades for varying range of volume and pressure. Provide permanent pitch angle indication vernier scale on hub. Provide for automatic adjustment while in motion. Provide adjustment stops to avoid overloading motor.
  4. Variable speed drives: to NEMA ICS 7.1.
6. Belt drive:
  1. Fixed or adjustable blade as indicated by externally mounted motors through V-belt drive. Provide internal belt fairing, external belt guards and adjustable motor mounts.
  2. Adjust blades for varying range of volume and pressure. Hubs shall facilitate indexing of blade angle. Provide automatic adjustment stops to avoid overloading motor.
  3. Variable speed drives: to NEMA ICS 7.1.

## **2.6 IN-LINE CENTRIFUGAL FANS**

1. Characteristics and construction: as for centrifugal fan wheels, with axial flow construction and direct or belt drive as indicated.
2. Provide AMCA arrangements 1 or 9 as indicated with stiffened flanges, smooth rounded inlets, and stationary guide vanes.

## **2.7 PROPELLER FANS**

1. Fabricate multibladed propellers of sheet steel or aluminum of airfoil shape, with grease lubricated ball bearings, direct or belt driven, complete with motor as indicated.

2. Provide blade guards, bird screen and automatic back draft dampers on discharge, with gasketed edges.

### **PART 3            EXECUTION**

#### **3.1                    MANUFACTURER'S INSTRUCTIONS**

1. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

#### **3.2                    FAN INSTALLATION**

1. Install fans as indicated, complete with resilient mountings specified in Section 23 05 48
2. Provide sheaves and belts required for final air balance.
3. Bearings and extension tubes to be easily accessible.
4. Access doors and access panels to be easily accessible.

#### **3.3                    CLEANING**

1. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

## 23 37 13 – Diffusers, Registers and Grilles

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

1. Section includes:
  1. Supply, return and exhaust grilles and registers, diffusers and linear grilles, for commercial and residential use.

#### **1.2 REFERENCES**

1. American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE).
  1. ASHRAE 70, Method of Testing for Rating the Performance of Air Outlets and Inlets.

#### **1.3 SYSTEM DESCRIPTION**

1. Performance requirements:
  1. Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

#### **1.4 SUBMITTALS**

1. Product Data:
  1. Submit manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
    1. Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).
    2. Indicate following:
      1. Capacity
      2. Throw and terminal velocity
      3. Noise criteria
      4. Pressure drop
      5. Neck velocity
2. Quality assurance submittals: submit following.
  1. Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  2. Instructions: submit manufacturer's installation instructions.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

1. Packing, shipping, handling and unloading:
  1. Deliver, store and handle materials in accordance with manufacturer's written instructions.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

1. To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity.
2. Frames:
  1. Full perimeter gaskets.
  2. Plaster frames where set into plaster or gypsum board.
  3. Concealed fasteners.
3. Concealed manual volume control damper operators as indicated.
4. Colour: standard or as directed by Owner's Representative.

### **2.2 MANUFACTURED UNITS**

1. Grilles, registers and diffusers of same generic type to be product of one manufacturer.

### **2.3 SUPPLY GRILLES AND REGISTERS**

1. See Schedule.

### **2.4 RETURN AND EXHAUST GRILLES AND REGISTERS**

1. See Schedule.

### **2.5 DIFFUSERS**

1. See Schedule.

### **2.6 LINEAR GRILLES**

1. See Schedule.

## **PART 3 EXECUTION**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

1. Compliance: comply with manufacturer's written recommendations or specifications.

### **3.2 INSTALLATION**

1. Install in accordance with manufacturers instructions.
2. Install with flat head stainless steel or cadmium plated screws in countersunk holes where fastenings are visible.
3. Bolt grilles, registers and diffusers, in place, in gymnasium and similar game rooms.
4. Provide concealed safety chain on each grille, register and diffuser in gymnasium and similar game rooms and elsewhere.

**END OF SECTION**

# *Technical Specifications*

# SANITARY

## **PART 1 - GENERAL REQUIREMENTS**

### **1.1 Scope of Work**

The work to be undertaken under this Division shall consist of the furnishing of all materials, labor, tools, equipment and other facilities and equipment and the satisfactory performance of all work necessary for the complete installation, testing and operation of the plumbing system in accordance with the applicable Drawings and this Division of the Specifications consisting of, but not necessarily limited to, the following:

- a) Cold water distribution and supply pipes (as indicated) and connection to the main building existing water distribution line.
- b) Soil, waste, and vent pipe system including connection to existing pipe stacks.
- c) Leakage testing of water supply, sanitary and storm drainage systems.
- d) Pressure testing of newly installed water systems.
- e) Disinfection of water distribution system.
- f) Submittal of certificate of tests on installed equipment and piping systems.
- g) Securing of all permits and licenses as required.
- h) Preparation and submittal of reproducible As-Built Plans and four (4) sets of whiteprints or as specified by the Owner
- i) Furnishing a written one-year warranty on the plumbing, and equipment installations.
- j) Investigation and coordination with other trades of all possible conflicts of plumbing works with others.

### **1.2 Coordination with Other Trades**

The Contractor is required to refer to the General Conditions and to all architectural, structural, electrical and mechanical plans and specifications and shall investigate all possible interference and conditions affecting his work.

### **1.3 Responsibility**

The Contractor and all persons or companies providing labor, materials, or both for this project are specifically referred to the General Conditions of the Specifications, and to the various other contract documents which may affect the completion of any work of other Divisions. In the absence of complete agreement among the Sub-Contractors of the General Contractor (Authorized by the Owner), supply dealers, or others affected by the Construction of this project, the General Contractor is to be held responsible for the coordination and completion of all works.

### **1.4 Drawings and Specifications**

The Contract Drawings and these Specifications are complementary to each other, and any labor or material whether called for or not by both, if necessary for the



successful operation of any particular type of fixtures or equipment specified under this contract shall be furnished and installed without additional cost to the Owner.

### **1.5 Intent**

It is not intended that the drawings shall show every pipe, fitting, valve and appliance. All such items, whether specifically mentioned or not, or indicated on the drawings, shall be furnished and installed if necessary, to complete the system in accordance with the best practice of the plumbing trade and to the satisfaction of the Owner/Architect.

### **1.6 Permits and Inspections**

The Contractor shall obtain and pay for all permits, bonds, and inspection fees and shall be responsible for all penalties incurred by himself or his agents. The contractor shall pay for the plans and technical specifications required for permit purposes.

### **1.7 Workmanship**

All works shall be performed in first class and neat workmanship by mechanics and their work shall be satisfactory to the Architect.

### **1.8 Code to be Followed**

All Plumbing Work to be done shall be in accordance with the National Plumbing Code of the Philippines and with the requirements of all applicable laws of the Republic and all local codes and ordinances of Quezon City.

## **PART 2 – MATERIALS**

### **2.1 Approval of Materials**

- a) Within thirty (30) days after award of contract, the Contractor shall submit for the Architect's approval, four (4) copies of a complete list of manufacturer's names of all equipment and materials he proposes to use under this Contract.
- b) After approval of the above list, and before purchase of any equipment or material, the Contractor shall submit to the Architect for approval four (4) complete sets of detailed information consisting of manufacturer's bulletins, shop drawings and parts list of equipment and the materials to be provided under this contract.
- c) The Contractor shall assume the cost of, and the entire responsibility for any change in the work as shown on the Contract Drawings which may be occasioned by approval of materials other than those specified.

### **2.2 Standards for Materials**

All materials shall conform to the standards listed below:

- a) PPR (Type 3) PN 20 Pipes and fittings - For cold water lines, Polypropylene pipes and fittings (PPR-Random Type 3), PN 20 conforming to EN ISO 15874, DIN 8077 and DIN 8078.
- b) PVC Pipes and Fittings – For Soil, Waste, Vent and Storm Drainage Pipes, PVC pipes and fittings series 1000, conforming to ASTM D2729 and ASTM D3311, for

pipes 100 diameter and below. Jointing shall be by solvent cement, conforming to ASTM D2564. For 150 diameter and above, use PVC pipes and fittings conforming to ISO 4435, ASTM D3033 or D3034, SD 35. Jointing shall be by solvent cement, conforming to ASTM D2564.

### 2.3 Alternate Materials

- a) Use of any material, devise, fixture or appurtenances not specified in these specifications may be allowed, provided that such alternate item has been approved, in writing, by the Architect and provided further that if a test is requires by the Architect to substantiate Contractor's claim for its suitability, the cost for testing shall be paid for by the Contractor.
- b) Test shall be done by an agency approved by the Architect and in accordance with generally accepted standards. In the absence of such standards, the Architect may specify the test procedure.
- c) In any substitution, all health and safety requirements shall be observed.
- d) The Contractor shall, together with his bid, submit a list of materials which he intends to use in lieu of the materials specified in the contract documents which he believes he cannot supply and stating the reason for the substitution. Material shown in this list shall be installed as specified, and no further request for substitution shall be made except when he can show a valid reason.

Requests for substitution shall be accompanied by:

- a) Reasons for substitution;
- b) Certificate of test indicating quality of substitute material;
- c) Cost comparison with material originally specified.

### 2.4 Identification of Material

- a) Each length of pipe, each fitting, trap, fixture and device used in the plumbing and piping system shall have cast, stamped or indelibly marked on name, the weight, the type, the class of product when so required by the standard mentioned in Sub-Section 2.2 above.
- b) All plumbing fixtures and materials installed without the above trademarks shall be removed and replaced with properly marked fixtures and fittings without any extra cost to the Owner.

### 2.5 Materials Schedule

#### A. PIPES AND FITTINGS

ITEMS	PPR PN 20	PVCP	GIP Schedule 40	Hubless CIP
1.Cold Water Supply	x			
2.Soil and Waste Pipes		x		
3. Vent Pipes		x		
4. Storm Drain		x		

#### Legend:

PVCP – Polyvinyl Chloride Pipe

PPR	–	Polypropylene Random Copolymer Pipe (Type 3)
CIP	–	Cast Iron Pipe
GIP	–	Galvanized Iron Pipe

**Notes:**

- a) Where uneven settlement at pipe joints is likely to occur, use Gibault joint or other suitable flexible fittings.

**B. GATE VALVES AND CHECK VALVES**

TYPE & SIZE ITEM OF VALVES	DISC	STEM	BODY	END CONNECTION	STANDARDS	REMARKS
1. 63mm (2-1/2") and smaller gate valves, 0.5kg/cm <sup>2</sup> (150 psi) working pressure	-	Rising	All bronze	Female Threaded	Federal Specs WW-V-58	
2. 75mm(3") and larger Gatevalves, 10.5kg/cm <sup>2</sup> (150 psi)working pressure		o.s. & y.	IBBM	F & F	AWWA	For use with pumping installation

**C. PIPE HANGERS**

- a) Horizontal Runs:

Adjustable mild steel or malleable-iron pipe hangers.

- b) Vertical Runs:

Mild Steel clamp or collars.

- c) Hangers for Water and Vent Pipes:

For 63mm (2-1/2") and larger: Band type 6.25mm x 32.5mm (1/4" x 1") flat mild steel or black iron with round iron rod with plates and nuts.

For 50mm (2") and smaller: Split ring type with 9.4mm (3/8 inch) iron rods with inserts, plates and nuts, toggle bolt clamps expansion shield.

**D. JOINTING**

- a) Cold Water Lines: Socket Fusion for PPR (Type 3) Pipes.
- b) Sanitary Drainage Lines: PVC solvent cement jointing shall be by solvent cement, conforming to ASTM D2564.
- c) Galvanized Iron Pipes: Screwed connection for 75mm diameter below; Flanged Connection for 75 mm diameter and above.
- d) Dissimilar Pipes - Adaptor fittings shall be used.

## 2.6 Testing of Materials

Samples of various types and kinds of materials shall be approved by the Architect/ Engineer before any work is started. During the progress of work, a sufficient number of samples, to ascertain the quality, may be tested and the cost of such samples shall be included in the price bid by the Contractor. Results of tests shall be submitted to the Architect/ Engineer for evaluation at least fifteen (15) working days before material is due for installation on the job.

## PART 3 - INSTALLATION

### 3.1 General

#### a) Cutting and Repairing:

The work shall be laid out in advance and any cutting of construction shall be done with the written permission of the Architect/ Engineer or his authorized representative. "Roughing-in" for pipes and fixtures shall be carried out along with the construction of the building or structure. Openings shall be left in walls and floors of proper sizes correctly located for the pipes by the Contractor shall do any additional cutting needed in case of error or omission and shall properly replace any concrete work or flashing around the pipes as may be required, without additional cost to the Owner(s).

All items to be embedded in concrete shall be thoroughly cleaned free from all rust, scale and paint.

#### b) Protection

The Plumbing contractor shall protect all his work and materials from loss, injury or defacement. Protection of fixtures and materials shall be provided by boards, papers, and/or cloth as required and any lost, damaged, or defaced materials shall be replaced by the Plumbing Contractor at his own expense.

#### c) Installation

1. The work throughout shall be executed in accordance with the best practice of the Trade and in the best and most thorough manner under the direction of a licensed Sanitary Engineer or Master Plumber and to the satisfaction of the Architect who will interpret the intent of the contract drawings and specifications shall have the power to reject any work and/or materials which are not in full accordance therewith.
2. No piping in any location shall be closed-up, furred-in, or covered before the examination and testing of same by government inspector, owner, or their representative.
- 3.

### 3.2 Fittings

- a) All changes in sizes of soil, waste, and drain lines shall be made with reducing fittings or reducers.
- b) Where it becomes necessary to use short-radius fittings in any other locations, prior written approval of the Architect shall be obtained.
- c) No fitting or connection that offers abnormal obstruction to flow shall be used.
- d) Enlargement of a 75mm (3-inch) closet bend or stub to a 100mm (4-inch) pipe is acceptable.

### 3.3 Cleanout Plugs and Traps

#### a) Cleanout Plugs

1. Clean-out installed in connection with a cast-iron bell and spigot pipes shall consist of a long-sweep quarter bend, or one or two-eight-bends extended to an easily accessible place, or where indicated on the Drawings.

### 3.4 Sleeves and Supports

#### a) General

1. Pipe sleeves, pipe supports, and fixtures supports shall be furnished and set and the Contractor shall be responsible for their proper permanent locations.
2. Pipe shall not be permitted to pass through columns, footings, beams, or ribs, unless noted on the Drawings or with the written approval of the Architect.

#### b) Pipe Sleeves

1. Pipe sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete.
2. Pipe sleeves, except sleeves through footings, shall be of sufficient diameter to provide approximately  $\frac{1}{4}$ " clearance around the pipe or insulation.
3. Pipe sleeves in walls and partitions shall be cast iron or steel pipe.
4. Flashing sleeves shall be installed where pipes pass through water-proofing membrane.
5. The sleeves shall be provided with an integral flashing flange or a clamping device to which a flashing shield can be clamped or soldered.
6. The space between the pipe sleeves shall be made water-tight by inserting packed-oakum and filling the remaining space with poured lead and caulking thoroughly.
7. Escutcheons shall be installed around all exposed pipes except water closet starts or bends passing through finished floors, walls or ceilings. Escutcheons shall be of sufficient outside diameter to cover the sleeve opening and shall fit snugly around the pipe. Escutcheons shall be cast brass chrome plated of the approved size and make, provided with a set screw to properly hold escutcheon in place.

### 3.5 Hangers, Anchors, Guides Inside Buildings

- a) All piping shall be rigidly, supported by means of approved hangers and supports. Piping shall be supported to maintain required position and pitching of lines, to prevent vibration and to secure piping in place and shall be so arranged as to provide space for expansion and contraction.
- b) Pipe hangers shall thoroughly cleaned and painted with one shop coat of red lead paint.
- c) Hangers shall conform to the standard details by the Contractor may, if he elects, use other commercial hangers having parts not lighter than indicated on the details, provided that he has obtained prior to written approval of the Engineer. Chains, straps, perforated bars or wire hangers will not be permitted.
- d) Inserts shall be cast iron steel and shall be of a type to receive a machine bolt in one horizontal direction and shall be installed before the concrete is poured.
- e) Vertical runs of pipe shall be supported by mild steel clamps or collars spaced not more than two floors apart.
- f) Schedule of hangers on water piping shall be as shown on the detailed plan.

### 3.6. Threaded Joints

Every threaded joint shall conform to American National Taper Pipe Thread, ASA B2.11945 or FS GGGP-351a. All burrs shall be removed. Pipe ends shall be cut to square.

## PART 4 - TEST AND DISINFECTION

### 4.1 Drainage System Test

- a) The entire drainage and venting system shall have all necessary openings which can be plugged to permit the entire system to be filled with water to the level of the highest stack-vent and/or vent-stack above the roof.
- b) The system shall hold this water for a full thirty (30) minutes during which time there shall be no drop more than 100mm (4").
- c) If and when the Architect/ Engineer decides that additional test is needed such as an air or smoke test on the drainage system, the Contractor shall perform such tests without additional costs to the owner.

### 4.2 Pressure Test for the Water System

- a) Upon completion of the roughing-in and before setting fixtures, the entire hot and cold water piping system shall be tested at a hydrostatic pressure one-and-half times the expected working pressure in the system when in operation, and proved tight at this pressure (but not less than 14 kg/cm or 200 psig) for a period of one (1) hour.

- b) Where the portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner similar to that described for the entire system and in the presence of the Architect.

#### 4.3 Leakage Test for the Water System

- a) Leakage test shall be conducted after the satisfactory completion of the pressure test and shall consist of an examination of all joints for leakage as well as an overall leakage test of the completed pipe line.
- b) The pressure to be maintained during the test shall be designed working pressure of the system.
- c) Leakage test shall be made only after a minimum of 24 hours after the pipe to be tested has been filled with water. No test shall be made until at least seven (7) days after the last concrete thrust or reaction backing has been cast with standard cement.
- d) The duration of each leakage test shall be two hours unless otherwise specified by the Architect.
- e) Each section of pipeline shall be slowly filled with water and the specified tests pressure, measured at the point of lowest elevation, shall be applied by means of a positive displacement type pump and reservoir connected to the pipe, in a manner satisfactory to the Architect.
- f) Before starting the leakage test, all air shall be expelled from the pipe. All exposed pipes, fittings, valves, and joints shall be examined for leakage during the test.
- g) Allowable leakage rate per 100 joints per inch of pipe diameter at pressure stipulated.

PRESSURE		LEAKAGE RATE	
Psi	Kg/cm <sup>2</sup>	Liters/Hr.	Liters/2 hrs.
50	3.5	1.45	2.90
75	5.3	1.75	3.50
100	7.0	2.05	4.10
125	8.8	2.30	4.60
150	10.5	2.50	5.00
200	14.0	2.90	5.80

#### 4.4 Defective Work

- a) If inspection or test shows any defect, such work or material shall be replaced and the inspection and test repeated until satisfactory to the Architect/engineer.
- b) All repairs to piping shall be made of new material at the expense of the Contractor.
- c) No caulking of screwed joints or holes will be accepted.

#### 4.5 Disinfection of Water Distribution System

- a) The entire water system shall be thoroughly flushed and disinfected with chlorine before it is placed in operation.
- b) Chlorination materials shall be either liquid chlorine or hypochlorite, as specified, and shall be introduced into the water lines in a manner approved by the Architect.
- c) The chlorine dosage shall be such as to provide not less than fifty milligrams per liter (50 mg/l) of available chlorine.
- d) Following a contact period of not less than twenty-four (24) hours, the heavily chlorinated water shall be flushed from the system with clean water until the residual chlorine content is not greater than two-tenth (0.20) mg/l. All valves in water lines being sterilized shall be opened and closed several times during the testing period.

### PART 5 -GUARANTEE

The Plumbing Contractor shall furnish to the Owner(s) a written guarantee covering the satisfactory operation of the plumbing installation in all its part for a period of one (1) year after

- a) Piping shall be properly supported by suitable anchors, brackets, or hangers. Vertical pipes shall be anchored by suitable galvanized steel straps. Pipe supports shall be provided as shown on the plans and whatever else necessary to prevent strain on joints or to facilitate taking down pipes.
- b) Carefully inspect all pipe and fitting before installation. Inspection of pipe shall include light tapping with a hammer to detect cracks or defects. No pipe, fittings or valve which are cracked or show defects shall be used.
- c) All pipes and fittings shall be carefully cleaned immediately before installation. Every open end of a pipe shall be carefully capped or plugged before leaving the work.
- d) Pipe Jointing

Flanged Pipe: Flanged pipe shall be cut true to length. Joints shall be made up square with even pressure upon the gaskets and shall be perfectly water-tight. Gaskets shall fit the inside dimension of the pipe accurately so that no surplus material projects out into the flow area. The completed joint shall be smooth and properly aligned.

- e) Piping Through Walls

Where pipes pass through walls, care shall be exercised to ensure that joints are watertight.



# *Technical Specifications*

# ELECTRICAL

**DIVISION 16 : ELECTRICAL****1600 : GENERAL****PART 1 - GENERAL****1.1 SCOPE OF WORK**

Work in this section shall cover the requirements for a complete electrical installation, including the furnishing of all labor, materials, equipment, tools, transportation, storage, incidentals and superintendence necessary to accomplish the electrical installation. The work includes, but not necessarily limited to, the installation of interior lighting and power system and such other work not mentioned in the plans or specifications but necessary to complete the Electrical system.

**WORKS INCLUDED:**

- a. Furnish and install complete service entrance wires, conduits and circuit breakers.
- b. Furnish and install complete feeder wires and conduits.
- c. Furnish and install all panel boards, kilowatt-hour meters, and automatic and manual transfer switches.
- d. Furnish and install complete wires and conduits for power outlet and lighting branch circuits.
- e. Furnish and install all motor circuit breaker with enclosures.
- f. Furnish and install complete wires and conduit for fire alarm system.
- g. Furnish and install fire alarm control panel (FACP), all manual station and bell.
- h. Application of power service at Meralco and assists the owner in preparing the necessary documents.
- i. Securing wiring permits and certificate of electrical inspection (C.E.I.) at City/Municipal Electricians Office.
- j. Furnish and installation of standby generator set.
- k. Megger, Operational and balancing test for all circuits.

**WORKS EXCLUDED:**

Payment of any Meralco deposits.

**1.2 QUALITY ASSURANCE**

**REFERENCE STANDARDS.** Electrical equipment, materials and procedures shall conform to the applicable requirements of the latest edition of the following: Underwriter's Laboratories, (UL), National Fire Protection Association (NFPA), National Electrical Manufacturer's Association (NEMA) and other related publications.

**WORKMANSHIP.** All equipment and materials shall be installed in a neat and workmanlike manner.

**QUALIFICATION OF INSTALLERS.**

All leadmen should be at least registered master or licensed electricians and the overall installation shall be supervised by a Professional Electrical Engineer, who has been thoroughly trained and experienced in the skills required, and who is completely familiar with the methods of installation, must be present at all time during the installation. He shall direct all work performed under this section.

### 1.3 COMPLIANCE TO APPLICABLE CODES AND REGULATIONS.

installation procedures, materials and equipment shall comply with the following as applicable:

- b. Philippine Electrical Code.
- c. National Electrical Safety Code, latest edition.
- d. Power Company Regulations.
- e. National Fire Protection Association
- f. Bureau of Labour Standards.
- g. Local laws and ordinances

#### REPAIRS TO DAMAGE EXISTING WORK.

Any damage to building, piping, or equipment caused by this work shall be repaired by skilled mechanics of the trades involved, at no additional cost to the Owner.

#### SUBMITTAL.

The contractor shall submit for approval one sample of each fixture, wires and wiring devices. For circuit breakers, boxes and panel boards, catalogues or brochures may be submitted.

#### RECORD DRAWINGS

The Contractor shall keep a careful record of all the changes made in the actual installation, which differs from that shown on the Contract Drawings. Upon completion, the Contractor shall, in a neat and accurate manner, finalize "AS BUILT" drawings on tracing paper. These drawings shall be submitted to the Construction Manager for approval. After approval, they shall become the property of the Owner. The print copies shall be duly signed and sealed by the Supervising Professional Electrical Engineer.

## PART 2 - MATERIALS

2.1 LIGHTING FIXTURES AND LAMPS. The Contractor shall provide and install all lighting fixtures of the size and type as indicated on the drawings. All fixtures shall be wired and installed complete, including all lamps and/or tubes, transformers, ballasts, supports, brackets, canopies, globes and other parts and devices necessary for complete installation and operation. Brand shall be approved by end-user.

2.2 EMERGENCY LIGHTING FIXTURES. Emergency lighting should have built-in battery Nickel Cadmium 3.6V, 1000 MAH 2x 1.2 watts Led/ 300 lumens and shall be set in the staircases, passageways, elevator lobbies, entrances and in the areas indicated in contract drawings. Built-in battery supply time shall not be less than 90 minutes. Brand shall be approved by end-user.

FLUORESCENT FIXTURE UNIT shall be complete. The tube shall be accessible without removing the fixture. Fixture shall be direct connected to 230 volts system as shown.

shall be built to the specification adopted by the certified ballasts manufacturer's approved by the Electrical Testing Laboratory with lowest sound rating with UL label. Ballasts shall be 220V rapid start high power factor series type "P" (0.95) p.f. Capacitive "A" sound rating.

Fluorescent tubes shall be standard day light rapid start of wattage and quantity shown.

Fluorescent fixture housing shall be powder coated with full mirrored backing US gauge 22 sheets steel. Non-reflecting surfaces shall be powder coated finished.

## 2.4 WIRES AND CABLES

for lighting and power requirements shall be approved by end-user, wires shall be THHN type. Sizes of wires shall be as indicated, and shall pass the stringent quality requirements set by the Department of International Trade and Industry of U.S. and the Philippine standards, Underwriter's Laboratories, and the A.S.T.M..

All wires shall be copper, soft-drawn and annealed, shall be of ninety-nine (99%) conductivity, shall be smooth and true and of a cylindrical form and shall be within one percent (+/-1%) of the actual size called for.

Wires or cables for lighting and power systems shall be nylon jacketed, plastic insulated for 600 volt working pressure, type THHN/THWN unless otherwise noted on plans or specified below. All wires shall be stranded copper.

Control leads for motors or lighting shall be type THHN/THWN for lighting and power systems. No wire smaller than 3.5sq mm or as indicated shall be used, except for control leads.

Fire-rated cables shall be used for the firemen's lift (service elevator), fire pump and jockey pump feeders, including the fire detection and alarm system and can be used for cable insulation shall be fire-resistant 600 volts rated, halogen-free and low-smoke generation. Fire resistance of cables shall be type-tested at 3-hours at 950 degree Celsius.

## 2.5 CONDUIT

for interior systems shall be Rigid Poly Vinyl Chloride (PVC) shall be approved by end-user and Intermediate Metal Conduit (IMC) shall approved by end-user.

No conduit shall be used in any system smaller than 15mm dia. electric trade sized, nor shall have more than four (4) ninety degree bends in any one run. If necessary, pull boxes shall be provided as directed.

No wire shall be pulled into any conduit until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit has been completed in every detail. Schedule 40 PVC is acceptable in installations embedded in concrete wall partitions or concrete slab.

The ends of all conduits shall be tightly plugged to exclude plaster, dust and moisture while the building is in the process of construction. All conduits shall be reamed to remove all burrs.

All pipes and fittings on exposed work shall be secured by means of metal clips spaced at maximum of 1.5m which shall be held in place by means of a bolt. When running over concrete-surfaces, the bolt shall be held in place by dyna expansion shield. All pipes on exposed work shall run at right angles to and parallel with the surrounding walls and shall conform to the form of the ceiling, no diagonal runs shall be allowed and all ends and offsets shall be avoided as far as possible. Where necessary, conduit fittings shall be used. Piping, in all cases shall be run perfect straight and true, satisfactory to the Construction Manager/Electrical Engineer.

## OUTLET BOXES AND FITTINGS

All outlets of whatever kind for all systems shall be provided with a suitable fitting which shall be either a box or other device specially designed to receive the type of fittings to be mounted thereon.

The Contractor shall consult the Construction Manager/Engineer as to the nature of the various fittings to be used before installing his outlet fittings, to the nature of appliance to be a finished design.

In the case of fixtures, their outlet fittings shall be provided with suitable fixture supports of a size and kind required by the fixture to be hung. Fixture studs in general shall be 10mm.

At all outlets on concealed conduit work, provide galvanized pressed steel outlet boxes gauge No. 16 class A of standard make.

#### WALL SWITCHES.

Wall switches shall be rated at 15 amperes, 250 volts, one-way, as . The type of switch shall be tumbler operation and the color, plating and appearance of wall plates shall be submitted prior to the purchase of wall switches and face plates. Switches shall be as manufactured by (NATIONAL BRAND or approved equal).

#### JUNCTION AND PULL BOXES.

Junction and pull boxes, of code gauge 16 steel, shall be provided for facilitating the pulling of wires and cables. Pull boxes in finished places shall be located installed with the permission and to the satisfaction of the Construction Manager/Architect/Engineer.

Pull boxes shall be fabricated with hinged-type, demountable and lockable covers. Knockouts shall be maintained for straight pull installation along two opposite side of the box only.

Pull boxes for straight pulls shall have the length of the box not less than forty-eight times the outside diameter, over sheath, of the largest shielded or lead covered

conductor or entering the box. The length shall not be less than thirty-two times the outside diameter of the largest non-shielded conductor or cable.

#### WALL RECEPTACLES.

Receptacle outlets shall be **Universal and Medical Grade Type** for flush mounting duplex rated at 20 amp. 230 volts, parallel slots with grounding slot by NATIONAL BRAND or approved equal. Type and color of receptacle outlet plates shall be as selected by the Architect and appropriate samples of outlets and plates shall be submitted prior to purchase of devices.

#### CIRCUIT BREAKERS AND DISCONNECT SWITCHES

shall consist of a quick-make, quick break type entirely trip-free operating mechanism, with contacts arc interrupter, and thermal-magnetic trip unit for each pole, all enclosed in a molded-phenolic case. The thermal magnetic trip unit shall provide time-delayed overload protection and instantaneous short circuit protection, and in case of overload or short circuit in any one pole. Circuit breaker shall be trip indicating, with the tripped position of breaker handle midway between "ON" and "OFF" positions. Circuit breakers shall be Schneider brand or approved equal. All circuit breakers rated above 225 amperes shall have interchangeable trip units.

All protective devices shall meet NEMA and Underwriter's Laboratories, Inc., specifications.

and disconnect switches shall be non-fusible and of sizes indicated on plans and be normal duty type, except as noted otherwise. Enclosures shall be NEMA-1 for indoor use and stainless steel, corrosion-proof NEMA-4X for outdoor use.

#### PANELS AND CABINETS

Standard panels and cabinets, as far as possible, shall be dead front construction furnished with trims for flush mounting as required. Cabinets shall

be minimum code gage no. 14 steel with gutters at least 4-inch wide and wider if necessary. The trim for all panels shall be finished in light gray or powdered coated over a rust inhibitor. Manufacturer's shop drawings in triplicate shall be submitted. Only one brand of circuit breaker and fabricator shall be used for the entire requirements of project. Combinations of brand will be rejected.

230- volt lighting panels shall be equipped with 20A circuit breakers in the branch circuits and a three-pole circuit breaker in the main unless noted otherwise on plans. As indicated on plans the panels shall be assembled in two or more selection if over 24 two-pole circuits or 16 three pole circuits.

Distribution panels shall be of same type as lighting panels except equipped with two-pole and three-pole circuit breakers frame up of sizes called for on plans. Ground bus terminals shall be standard features to the panel, using compression type lugs for grounding wire connection with the ground bus.

Bus bars shall 99.99% pure copper with regular cross sections. All bus bar connections shall be silver-plated. Ground bus shall be sized at 50% of the phase buses.

bars must be braced enough to withstand the expected fault current as indicated in the load schedules.

## MOTORS

Provide proper size circuit breaker for all motors 15 meters away from the source panel board. Use motor nameplate data for selection of circuit breaker or rating shown on plans.

Provide an enclosure for circuit breaker motor protection NEMA 1 for general use and the equivalent of NEMA 3R for exterior or wet or damp locations.

### 3.2 GROUNDING AND BONDING EQUIPMENT.

Shall be in accordance with Article 250 N. E. C. as amended by the office of the Building (DPWH) or as shown on plans.

### 3.3 GROUNDING CONDUCTORS.

Size per Table 250.66 and Table 250.122, N. E. C. or as shown on the plan.

## PART 3 - LOCATION OF WIRING AND OUTLETS

shall be the responsibility of the Contractor to study all pertinent drawings and obtain precise information as to the exact location of all outlets, apparatus, appliances, and wiring to be installed. It shall be understood that any outlet may be relocated on a distance not exceeding one meter from the location shown on the drawings. Contractor shall make any necessary adjustment of his work to fit conditions for recessed fixtures and for outlets occurring in tiles, blocks, granite, marble, wood panelling, or other special finish materials in order that all boxes may register flush with finish and shall be centered properly. In centering outlets, due allowance shall be made for overhead piping, ducts, window, and door trim, variations in thickness of plastering, etc., as erected, regardless of conditions which may be otherwise shown on small scale drawings. Outlets incorrectly located shall be properly relocated at the Contractor's expense. Local switches near doors shall be located at the stride side of the door.

The center of wall outlets, socket-outlets, switches, telephone outlets, pilot lights, indicating lights and clock outlets shall be installed at heights above finished floor as indicated on the drawings. Where mounting heights are indicated on the Electrical Drawings, they shall be verified with Architect's drawings before installation.

## **PART 4 - INSTALLATION**

### **CONDUIT INSTALLATION**

Conduit installation shall be made with rigid poly vinyl chloride (PVC), conduit installed underground shall be encased in 75mm concrete.

Exposed conduit shall be Intermediate metal conduit (IMC) installed parallel with or at right to the building walls and ceilings and shall be supported by clamp and struts, U-bolt and hangers or bracket. Fastenings shall be by dyna bolts on concrete masonry; by machine screws, welded threaded studs, or spring tension clamps on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine or wood screws. Threaded C-clamps may be used on rigid steel conduit only. The load applied to fasteners shall not exceed 1/4 of the proof test load. Fasteners attached to concrete ceilings shall be vibration and shock resistant. Holes cut to a depth of more than 15mm in reinforced concrete beams or to a depth of more than 20mm in concrete joints shall not cut the main reinforcing bars. Holes not used shall be filled. In partitions of light steel construction, sheet-metal screws shall be used. In suspending-ceiling construction, conduit shall be run above the ceiling and only lighting system branch circuit raceways shall be fastened to the ceiling supports. Spring steel fasteners may be used for lighting branch circuit raceway supports in suspended ceilings in dry locations. Conduits shall be fastened to all sheet metal boxes and cabinets with two lock nuts where required by the National Electrical Code, where insulated bushings are used and where bushings cannot be brought into firm contact with the box. Locknuts shall be the type with sharp edges for digging into the wall of metal enclosures. Bushings shall be installed on the ends of all conduits and shall be of the insulating type where required by the National Electrical Code. (Exposed risers in wire shafts of multi-story buildings shall be supported by clamp and strut bar or approved fastener at each floor level and at intervals not to exceed 1.5 meters. Fittings for IMC conduit shall be of the same brand.)

Conduit installed in concrete floor slabs shall be located so as not to affect the structural of the slabs. Conduit shall be installed within the middle one-third of the concrete slab except where necessary to not disturb the reinforcement. Outside diameter of conduit shall not exceed one-third of the slab thickness and conduits shall be spaced not closer than three diameters except at cabinet locations. Curved portions of bends shall not be visible above the finish slab. Slab thickness shall be increased as necessary to provide a minimum one inch cover over conduit. Where embedded conduits cross expansion joints, suitable watertight expansion fittings and bonding jumpers shall be provided. Conduit larger than one inch trade size shall be parallel with or at right angles to the main reinforcement; when at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.

Conduits installed in contact with earth shall be Rigid PVC. PVC conduits shall be encased in 75mm concrete if run underground.

Changes in direction or runs shall be made with symmetrical bends or cast-metal fittings. Field made bends and of offset shall be made with a hickey or conduit-bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways in damp or wet locations shall be avoided. Plaster dirt or trash shall be prevented from lodging in raceways, boxes, fittings and equipment during construction. Clogged raceways shall be freed on all obstructions.



## BOXES, OUTLETS AND SUPPORT

Boxes shall be in the wiring or raceway systems wherever required for pulling of wires, making and mounting of devices or fixtures. Boxes shall be sheet steel. Each box shall have the volume required by the National Electrical Code for the number of conductors enclosed in the box. Boxes for mounting lighting fixtures shall be not less than 4 inches except that smaller boxes may be installed as required by fixture configuration as approved. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers, as required. Boxes for use in masonry block or tile walls shall be square cornered tile type, or standard boxes having square-cornered tile-type covers. Cast metal boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces shall be gasketed. Separate boxes shall be provided for flush or recessed fixture when required by the fixture terminal operating temperature and fixtures shall be readily removable for access to the boxes unless ceiling access panels are provided. Boxes and pendants for surface-mounted fixtures or suspended ceilings shall be supported independently of the ceiling supports, or adequate provisions shall be made for distributing the load over the ceiling support members in an approved manner. Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel work. Threaded studs driven in by powder charge and provided with lock washers and nuts, or nail-type nylon anchors may be used in lieu of wood screws, expansion shields, or machine screws. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; cast metal boxes having thread less connectors and sheet metal boxes shall be supported directly from the building structure or by bar hangers. Where bar hangers are used, the bar shall be attached to raceway, which shall be supported with an approved type fastener not more than 20mm from the box. Penetration into reinforced concrete members shall avoid cutting any reinforcing steel.

boxes of not less than the minimum size required by the Philippine Electrical Code shall be constructed of code gauge galvanized sheet steel. Boxes shall be furnished with screw-fastened covers. Where several feeders through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation.

Conduit stubbed up through concrete floors for connections to free standing equipment shall be provided with a short elbow and an adjustable brass tap or coupling brass or bronze threaded for plugs, set flush with the finished floor. Wiring shall be extended in rigid threaded conduit to equipment, except that where required, flexible conduit may be used 150mm above the floor. Screw driver-operated threaded flush plugs shall be installed in conduit from which no equipment connections are made.

## DEVICE PLATES OF THE ONE-PIECE TYPE

be provided for all outlets and fittings to suit the devices installed. Plates on unfinished walls and on fittings shall be of modern type. Plates on finished walls shall be of same finish. Screws shall be of metal with countersunk heads, in a color to match the finish of the plate. Plate shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster filling will not be permitted. Plates shall be installed with an alignment tolerance of 1mm. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed



## RECEPTACLES.

Single and duplex receptacles shall be rated 2-pole, 3-wire grounding type, 15 amperes, 250 volts. Body shall be ivory moulded phenolic compound supported on a metal mounting strap. Receptacles shall be side and back-wired with screw type terminals. Exposed metal parts shall be corrosion resistant. The ground pole shall be connected to the mounting strap. Special purpose receptacles shall be rated as indicated.

## TOGGLE SWITCHES

shall be totally enclosed with bodies of moulded compound and a mounting strap. Handles shall be ivory. Wiring terminals shall be of the screw type, back or side wired. Switches shall be rated quiet type. AC only, 15 ampere, 250 volt. Switches shall be single poles unless otherwise indicated.

## PANELBOARDS.

Lighting and appliance branch-circuit panel boards shall be circuit equipped, Type I, Class I. Circuit breakers shall be the rating, class painted.

## GROUNDING AND BONDING.

1All exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor and neutral conductor of wiring systems shall be . The ground connection shall be made at the main service equipment and shall be made to driven rods on the exterior of the building or to the point of entrance of the metallic water service. Connections to flanged pipes shall be made to the street side of the flanged connection. No connections shall be made to water pipes coated with insulating materials.

## RECESSED FLUORESCENT FIXTURES.

Fixtures shall be installed in suspended ceiling opening as indicated. These fixtures shall have adjustable fittings to permit alignment with ceiling panels. Fixtures installed in fire-resistive type of suspended ceiling construction shall be provided with fireproofing boxes having materials of the same fire rating as the ceiling panels, in conformance with the Building Materials List of Underwriter's Laboratories, Inc.

## FLEXIBLE CONNECTIONS

of the short length shall be provided for equipment subject to vibration, noise transmission, or movement and for all motors. Liquid-tight flexible connections shall be provided as required.

## EQUIPMENT CONNECTIONS.

All wiring for the connection of motors and control equipment shall be furnished and installed under this section of the specification, except as otherwise specifically noted or specified. Automatic-control wiring, signalling, and protective devices are not included in this section, but shall be furnished and installed under other sections of the specifications. Control wiring not shown on the electrical drawings shall be furnished.

## **PART 5 - TESTS**

All wiring shall be tested for circuit continuity to assure that the wiring system is free of short circuit, accidental grounding or other defects prior to normal system operation by using megger test. Tests shall be performed after all wiring is completed, and again after fixtures and equipment are connected and ready for use.

After the Contractor has assured himself that the wiring systems are free of faults, the Contractor shall then energize the systems from their normal power sources and confirm that all systems are operational as required by the contract documents, prior to final inspection.

-End-

**DIVISION 16 : ELECTRICAL****16700 : AUXILIARY SYSTEM****Telephone/Data/Public Address/CCTV/CATV/FDAS****PART 1 - GENERAL****1.1 SUMMARY**

- a. Provide complete Telephone, Public address, CCTV, CATV, BMS and FDAS where shown on the drawings, as specified herein and as needed, for a complete and proper installation including, but not necessary limited to:
  - 1. Main terminal cabinet, Telecommunications cabinet, terminal blocks, and distribution frame as needed
  - 2. Telephone, Public Address/Paging, CCTV, CATV BMS and FDAS conduits and cable trays
  - 3. Supports for fixtures and other materials and equipment in association therewith;
  - 4. Interconnections between Telecommunications closets, equipment rooms and entrance facilities including backbone cables, horizontal cables and terminations.
  - 5. Wiring system, in conduit, for equipment and controls.
  - 6. Provide pull wires in all telephone, Public address, CCTV, CATV BMS and FDAS units.
  - 7. Other items and services required to complete the systems.
- b. Related work
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General conditions, and Sections in Division 1 of these Specifications.

**1.2 SUBMITTALS**

- a. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit;
  - 1. Materials list of items proposed to be provided under this section.
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
  - 3. Manufacturer's recommended installation procedures which, when approved by the engineer/architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
- b. Upon completion of the work of this section, and as a condition of its acceptance, deliver to the Engineer/Architect two copies operation and maintenance manual of the related equipment in accordance of these specifications.

### 1.3 QUALITY ASSURANCE

- a. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- b. Without additional cost to the owner, provide such other labor materials as are, required to complete the work of this section in accordance with the requirements of governmental agencies having jurisdiction regardless of whether such materials and associated labor are called for elsewhere in these contract documents.

### 1.4 WARRANTY

- a. Provide a minimum of one-year warranty on all materials and labor.

## PART 2 – PRODUCTS

### 2.1 GENERAL

- a. Provide only materials that are new, of the type and quality specified. Use products of one of the following, or an equal approved in advanced by the Engineer/Architect.
- b. Provide other materials, not specifically described but require for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer/Architect.

### 2.2 TELEPHONE, DATA AND CATV

- a. Provide conduits, service entrance equipment, terminals boards, connectors, cables (CAT6A, RG6) and other items shown on the drawings or require for a complete, approved, and operating telephone and CATV service, except for such items and equipment as are furnished by the serving company. Branch conduits shall be non-metallic conduit (PVC) with a minimum diameter of 20mm for installations embedded in concrete slab or concrete wall partition and EMT for all exposed layout.
- b. The Contractor shall furnish and install Community Master Antennae Television System(CATV) as shown in the drawings. The installation requirement is specifically on the interfacing with the existing system
- c. Provide pull boxes/service boxes so that no conduit runs is longer that 100meters, or contains more than two 90 degrees bends/elbows. Pull, splice and/or junction boxes shall be provided with removable cover and lock at the underside when placed above ceiling or as shown in the plans
- d. Provide pull wires in all Telephone and DATA and CATV units.
- e. Provide splitters, line amplifiers and attenuators as needed.
- f. All work materials shall be brand new, free from defects, installed and constructed in a workmanlike manner according to prevailing standard practice. Installation of the system shall be governed by the provision of the latest edition of the Philippine

Electrical Code (PEC) and other existing rules and regulations of the locality and governing agencies.

Tap-off shall be flush-mounted, with back match outlet plates. It shall be provided with bushing and cable connectors to accept **RG-6 coaxial cable (for Analog) and Cat6A (for digital)**, size as required. Input and output impedance shall be 75 ohms. Tap-off shall have low insertion loss and shall be provided with end-of-line resistor when required.

Cables shall be of the coaxial type with a characteristic impedance of 75 ohms, plus or minus 10 percent over the entire frequency range of the system. All cables shall be frequency-swept for abnormal losses. Conductors shall be copper. Insulation shall be solid or expanded polyethylene. Shielding shall be copper braid.

All cable connections and tap-off shall be made with approved silver-plated solder less, 75 ohm-fittings designed for the purpose. Cables shall be installed without kinks, sharp bends, or deformations, in a manner to prevent abrasion and shall not be less than 300mm from any electric or telephone line or equipment.

Cables shall be installed in embedded PVC in concrete slab or concrete wall partitions but in any exposed layout it must be EMT.

The Contractor shall be responsible for all supervision, commissioning, tests and adjustment for the system. Such work shall be performed by or under direct supervision of an Electronics and Communications Engineer.

The equipment supplier shall guarantee the equipment for a period of two years to be free from inherent defects in materials and workmanship. Any defective part or equipment shall be repaired or replaced free of charge.

## 2.3 PUBLIC ADDRESS

- a. Provide conduits and cables, terminals, volume controls. Speakers and other items shown on the drawings or require for a complete public address system.
- b. Provide a racking unit in the equipment room.
- c. Provide pull boxes and terminals as needed.
- d. Provide public address system shown on the drawings.
- e. Provide termination connectors and terminal blocks as needed.
- f. Wiring Diagram for PA/BGM shall be #14/16 THHN/THWN wires in schd. 40 PVC for all embedded installations and EMT for exposed layout.
- g. Installation of the system shall be governed by the provision of the latest edition of the Philippine Electrical Code (PEC). Institute of Electronics and Electrical Engineers (IEEE) and Institute of Electrical, Radio and Electronics Engineers (IERE).
- h. The Contractor shall be responsible for all supervision, commissioning, tests and adjustments for the system. Such work shall be performed by or under direct supervision of an Electronics and Communications Engineer.
- i. The equipment supplier shall guarantee the equipment for a period of two years to be free from inherent defects in materials and workmanship. Ant defect part or equipmwnt shall be repaired or replaced free of charge.

- j. Provide the following equipment and details. All materials and equipment to be furnished shall be new and standard products of a single manufacturer regularly engaged in the production of such equipment similar to

#### EQUIPMENT LISTING

1. Ceiling Mount Speakers 10 Watts
2. Horn Speakers 20 Watts
3. Amplifier Unit
4. Monitoring Unit
5. Mixing Unit
6. Volume controls
7. Back-up Power supply unit
8. Microphone
9. CD Player
10. Tuner

#### DETAILS

1. Volume controls shall be installed for each identified station.
2. Speaker selector unit shall be installed to allow operator to select which area or station to page.
3. Optional input devices such as CD Player, Tape Deck or Tuner can be installed as a source of music or other aural materials.
4. Equipment Main Rack unit shall be installed at the security room.
5. A connecting block shall be installed on each floor to minimize the number of riser cables. It shall also allow connection of additional speakers for future expansion.
6. A 2-conductor gauge 14-16 wire shall be installed from the main rack to the connecting block of each floor. A riser conduct is needed for this purpose.
7. A 2-conductor gauge 14-16 wire shall be used as distribution from the connecting block via parallel connection. A conduct on each floor is needed for this purpose.

#### Speaker (ceiling mount)

Rated input: minimum 6 watts  
 Input impedance: 3.3kohms, 5kohms, 10kohms  
 Frequency response: 100-12,000 hertz

#### a. Speaker (horn type)

Rated input: minimum 20 watts  
 Input impedance: 500ohms, 1kohms, 8ohms  
 Frequency response: 180-15,000 hertz

#### b. Monitor Unit

Monitor speaker: at least 1 watt  
 Power meter: peak level meter  
 Monitor circuits: 4 circuits + 40db 10 ohms

## c. Audio mixer unit

Input circuit: at least 10  
Output line: 2(0db 20 ohms unbalanced)

## d. Amplifier unit

Maximum Rated output: At least 600 watts  
Frequency response: 50-15,000 hertz  
S/N ratio: more than 75 db

## e. Speaker selector unit

Speaker selector: 10 stations and all call  
Power capacity: 50 W per circuit (Continuous rated), 100W per 1 circuit (voice)  
500W at all call (Continuous rated), 1,080W at all call

2.4 **CCTV**

- a. Provide conduits and cable trays and cables (RG6 Siamese Twin Cable, CAT6A), terminals, and other items shown on the drawings or require for a CCTV system. CCTV System shall be as manufactured or similar.
- b. Provide pull boxes and connectors as needed.
- c. Provide CCTV system shown on the drawings.
- d. Provide termination connectors.
- e. All materials and equipment to be furnished shall be new and standard products of a single manufacturer regularly engaged in the production of such equipment. Requirement for this expansion shall only provisions of monitoring cameras. These cameras shall be interfaced with the existing building monitoring facilities.
- f. Provide the following equipment and details.

**EQUIPMENT LISITNG**

- 1.1 1/3 "CCD colored Camera
- 1.2 Super-wide Fixed Iris Lens
- 1.3 Wide angle lens
- 1.4 16 digital channel duplex multiplexers
- 1.5 Time Lapse Video Recorder
- 1.6 32" colored TV video monitor

**DETAILS**

1. The Fixed CCD cameras for the parking areas shall be mounted with super-wide angle with fixed iris lenses for optimum coverage area.

2. The remaining cameras shall be mounted with wide angle with fixed iris lenses.
3. A video multiplexer shall be used to allow viewing of all cameras simultaneously in a 32" Colored Monitor.
4. A 32-inch spot colored monitor shall be used to allow security personnel to view a single monitor any camera location as well as monitor recorded materials from the DVR.
5. A DVR with 8TB HDD recording 720P all channel shall be used to record simultaneously all camera signals for archiving purposes.
6. Equipment Main Rack and console unit shall be provided at the security room.
7. Video cables shall be provided from the security room to each camera location. RG-6 Siamese coaxial Belden or equivalent shall be used.
8. All camera power supply shall be supplied from the security room. An AC power cable will be installed with the video cable. 12/24 VAC shall be used.

## 2.5 SPECIFICATIONS

### CCTV

#### a. Camera unit

1/3" B/W CCD  
 Pick-up device 1.3MP AHD/CVI CAMERA, CMOS/CCD  
 Electronic light control: between 1/60s and 1/80,000s  
 Minimum scene illumination: .081lx at F1.4. 0.06lx at F1.2, 0.02lx at f0.75  
 Lens mount: C mount or CS mount selectable  
 Power source 12/24VAC

#### b. Super-wide lens

Focal length: 2.8mm  
 Aperture ratio: F2.8  
 Pick-up device 1.3MP AHD/CVI CAMERA, CMOS/CCD  
 Mount: CS mount

#### c. Wide angle lens

Focal length: 6.0mm  
 Aperture ratio: F2.8  
 Pick-up device 1.3MP AHD/CVI CAMERA, CMOS/CCD  
 Mount: CS mount

#### d. DVR (Digital Video Recorder)

Camera input 16 cameras, 720P all channel recording  
 Camera output: 75 ohms automatic termination looped through  
 Recording output: composite multiplexed with camera ID  
 Multi screen output: 75 ohms composite  
 Spot output: 75 ohms composite  
 Buzzer: 1 built in



e. Monitor Specs

LED TV with HDMI input  
Horizontal resolution: not less than 1080p resolution  
TV system: NTSC

## 2.6 FIRE DETECTION AND ALARM SYSTEM Components

a. Fire Alarm Control Panel

b. Local Combination Box

The local combination box shall be consisting of red-colored indication lamp, manual pull station and fire alarm bell. This box shall be flush-mounted, and the exact location must be confirmed to the Architect and the Engineer.

c. Manual Pull Station

The manual pull station shall be inside the local combination box with indication lamp to indicate the receipt of the signal from the manual station. Material shall be constructed from 1.2mm thick steel with bright red color finish. Alarm signal is transmitted to the control panel by pushing the push-button inside the box.

d. Bell

This is a motor driven low-current consumption operating at 24V DC. Bells shall be operated on the fire outbreak floor and the floor just above and below it and in the other case can be simultaneously.

e. Indication Lamp

The indicator lamp identifies the fire alarm station. Power supply to the bulb is 24 V, 5W coming from the fire alarm control panel.

f. Smoke Detectors

This shall be **photoelectric type** to be effective in detecting the outbreak of fire at the earliest stage. Detectors must be provided with insect filter to prevent entry of insects and dust. The detector must consist of a chamber, a reliable sensor and solid-state circuit of the fire alarm detection loop and shall cause a trouble signal at the panel.

g. Heat Detectors

This shall be of the rate of rise and fixed -temperature type.

h. Annunciators

The annunciator or mimic board shall provide a pictorial representation of the location of the fire, making it suitable for use in building entrances used by the fire fighters. It utilizes a CAD drawing plan of the site, with programmed LEDs to illuminate different areas of this plan in the event of fire.

Fire Detection and alarm system must interface to Elevator, LVSG, Electric Fire Pump and jockey pump.

Fire alarm system components from the fire alarm control panel to manual pull stations, fire alarm bells, strobe lights, smoke detectors and heat detectors shall be of the same brand. No substitution from other brands shall be allowed.

FDAS wiring schedule shall be as per the manufacturer's recommendation to suit the design intent. For 220Vac power system requirement of the FDAS, use the minimum size of 1.6mmØ THHN/THWN. Conduiting system shall be in sched. 40 for all embedded installation and electrical metallic tubing coated with polyethylene for exposed layout.

All work materials shall be brand new, free from defects, installed and constructed in a workmanlike manner according to prevailing standard practice.

The Contractor shall be responsible for all supervision, commissioning, tests and adjustment for the system. Such work shall be performed by or under direct supervision of Electronics and Communications Engineer.

The equipment supplier shall guarantee the equipment for a period of two years to be free from inherent defects in materials and workmanship. Any defective part or equipment shall be repaired or replaced free of charge.

### **PART 3 – COMMISSIONING**

#### **a. TESTING**

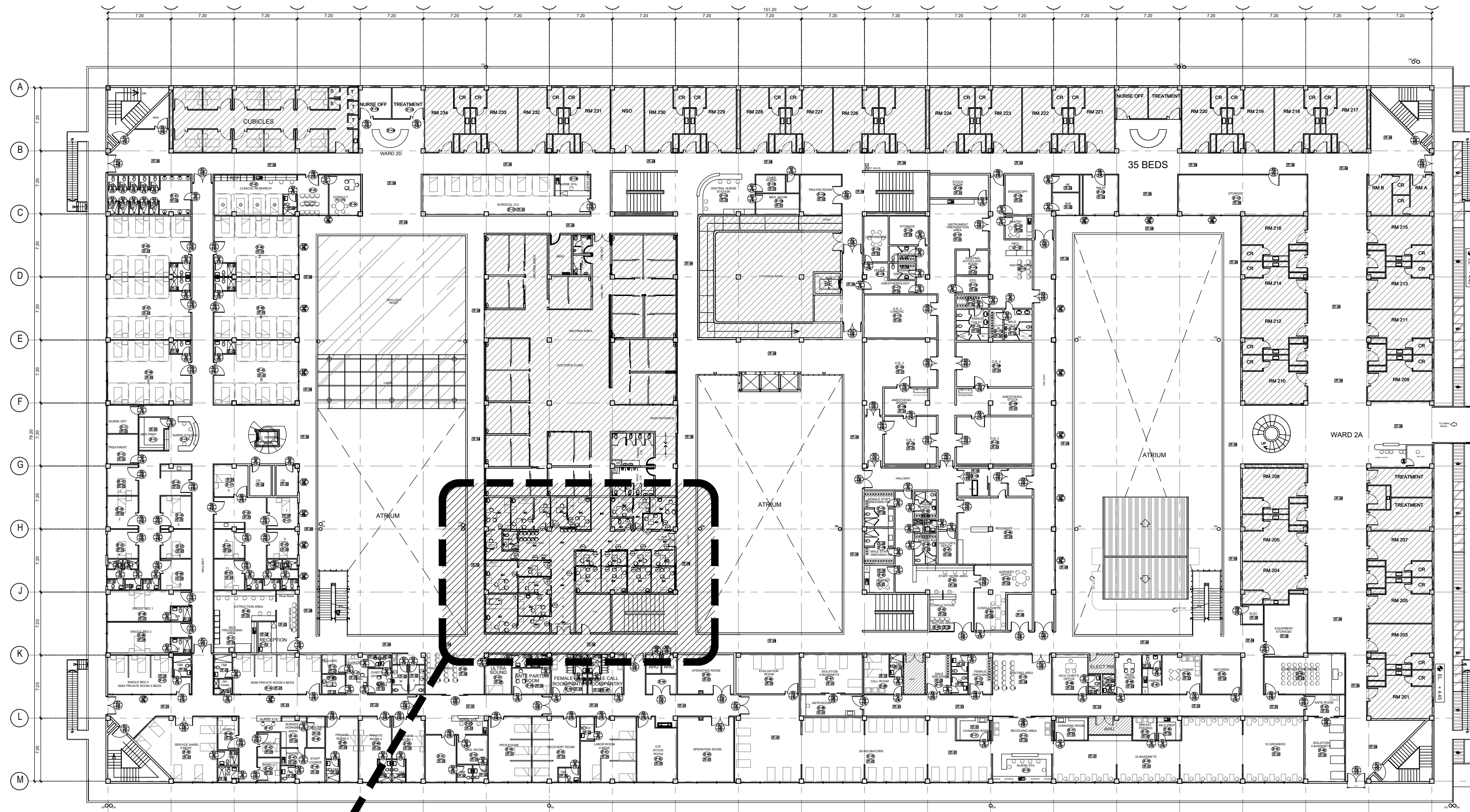
1. Test all parts of the auxiliary system and prove that all such items under this section function in the required manner.

#### **b. PROJECT COMPLETION**

1. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under Article 1.2 of this Section of these specifications
2. Upon completion of the work of this section, thoroughly clean all exposed portions of the installation removing all traces of foreign materials. Walk-thru inspection by the Owner, Engineer and Contractor. Any discrepancy noted shall be fixed before project is closed. Submit copy of "As-Built" drawings to Owner and Engineer.

-End-





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REPUBLIC OF THE PHILIPPINES  
**DPWH**  
 OFFICE OF THE BUILDING OFFICIAL  
 CITY: DISTRICT: MUNICIPALITY

LAND USE AND ZONING

LINE AND GRADE

ARCHITECTURAL

STRUCTURAL

SANITARY

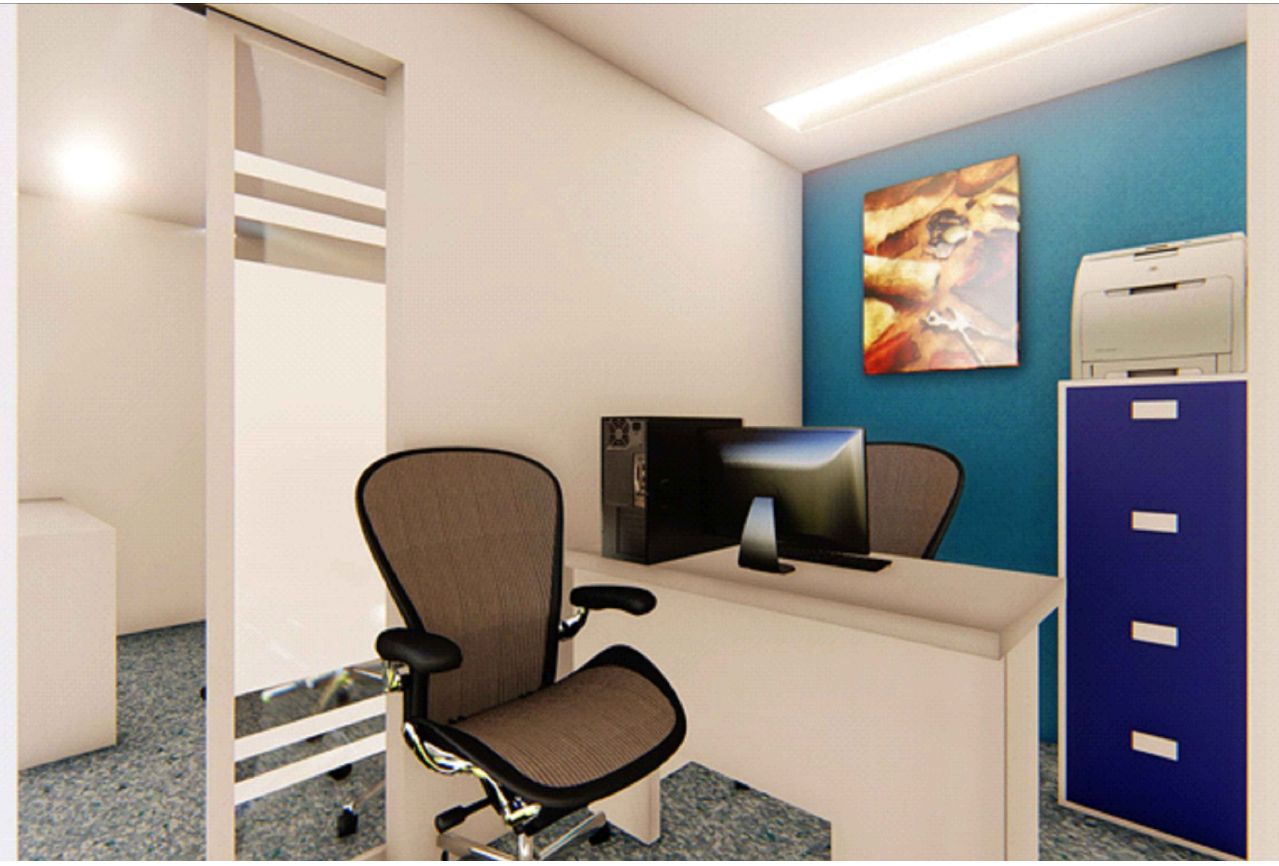
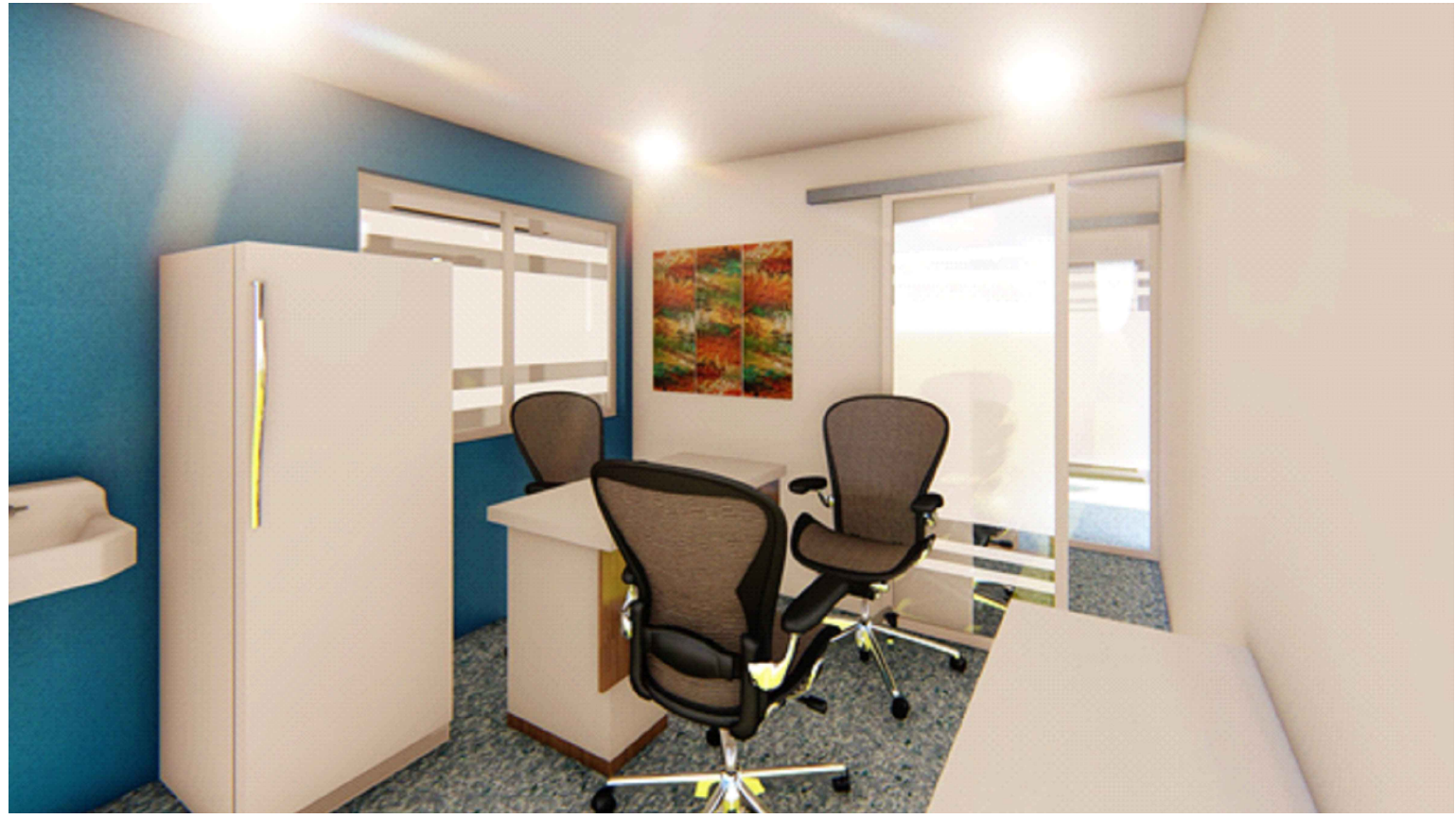
ELECTRICAL

MECHANICAL

**LOCATION**

1  
AID-3-01

**KEY PLAN**



**INTERIOR PERSPECTIVES**

**OSCAR R. RUIVIVAR & ASSOCIATES**  
 ARCHITECTS  
 ENGINEERS  
 INTERIOR DESIGNERS

No. 26 Wisdom St. Teresa Village Project 6, Quezon City  
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ARCHITECT:  
**OSCAR R. RUIVIVAR**  
 ARCHITECT-OF-RECORD

REG. NO. 5713      VALID UNTIL: 5-15-21  
 PTR. NO. 7324412      DATE: 01-04-19  
 T.I.N. NO. 113-604-561      PLACE: QUEZON CITY  
 IAPDANO: 01937 250805 021119      DATE: 06-30-19


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 said Documents.

CONSULTANT:  
 ENGINEER

REG. NO.      DATE:  
 PTR.      DATE:  
 T.I.N.      PLACE:

PROJECT:  
**CONSTRUCTION OF DOCTOR'S PRIVATE  
 CLINIC EXTENSION**

LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.

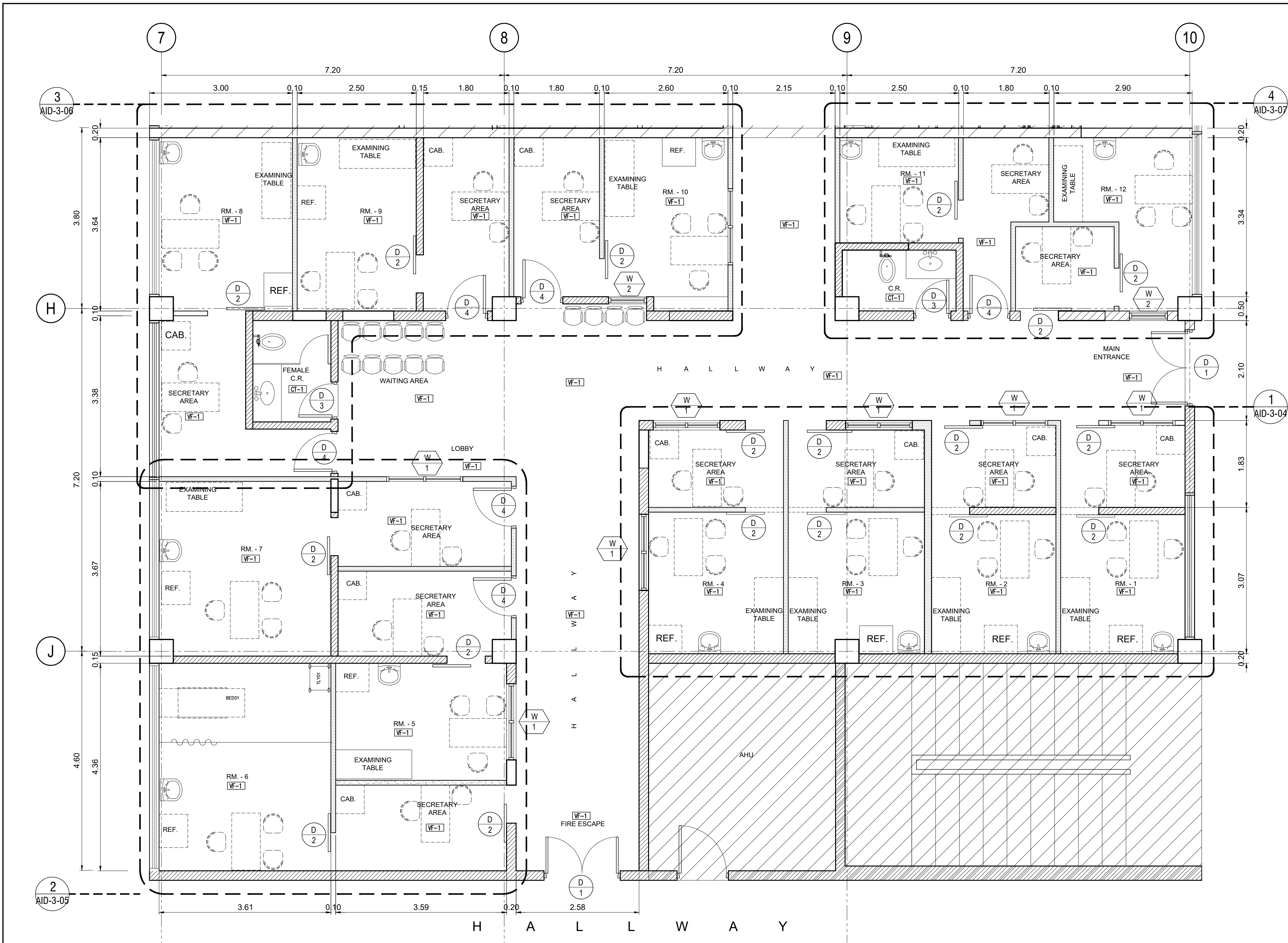
OWNER:  
  
**PHILIPPINE CHILDREN'S  
 MEDICAL CENTER**

CONCURRED:  
 JULIUS A. LECCIONES, MD, PhD, DDA, CESO III  
 EXECUTIVE DIRECTOR  
 Philippine Children's Medical Center

SHEET CONTENTS:  
**KEY PLAN  
 LOCATION PLAN  
 TABLE OF CONTENTS  
 INTERIOR PERSPECTIVE**

REVISIONS:	DATE:	SHEET NUMBER
		<b>AID-3-01</b>
ISSUE DATE:		DRAWN BY: SCALE:





**1 FLOOR PLAN**  
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**FLOOR FINISHES**

VF-1	FLEXIBLE HOMOGENOUS COMPACTED FLOOR COVERING IN SHEETS (BEACH 2062)
VF-2	FLEXIBLE HOMOGENOUS COMPACTED FLOOR COVERING IN SHEETS (COBALT 2081)
CT-1	60 X 60 MM HUELVA SOLIDO CERAMIC TILES (MATTE FINISH)

**CEILING FINISHES**

CF-1	600 X 600 MM ACOUSTIC TILES ON POWDER COATED ALUMINUM T-RUNNERS
CF-2	12 MM THK 2HR FIRE RATED GYPSUM BOARD (REGULAR)
CF-3	12 MM THK 2HR FIRE RATED MOISTURE RESISTANT GYPSUM BOARD

**OSCAR R. RUIVIVAR & ASSOCIATES**  
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 ENGINEERS  
 INTERIOR DESIGNERS  
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ARCHITECT: <b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD	
REG. NO. 5713	VALID UNTIL: 5-15-21
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T.J.N. NO. 113-604-561	PLACE: QUEZON CITY
IAPDANO: 01937 250805 021119	DATE: 06-30-19

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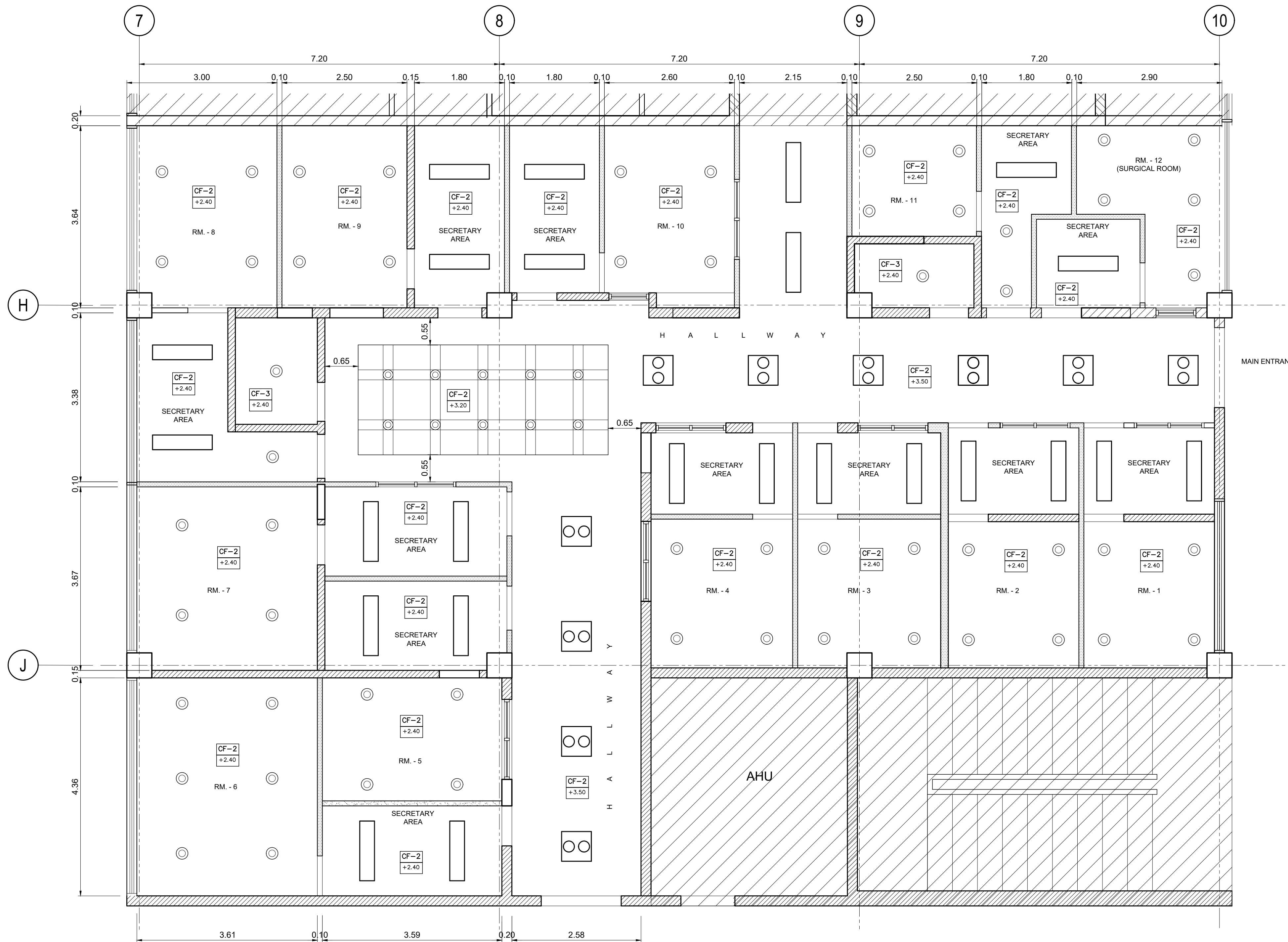
CONSULTANT: ENGINEER	
REG. NO.	DATE:
PTR. NO.	DATE:
T.J.N. NO.	PLACE:

PROJECT: CONSTRUCTION OF DOCTOR'S PRIVATE CLINIC EXTENSION	
LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.	

**PHILIPPINE CHILDREN'S MEDICAL CENTER**  
 CONCURRED:  
 JULIUS A. LECCIONES, MD, PhD, DDA, CESO III  
 EXECUTIVE DIRECTOR  
 Philippine Children's Medical Center

SHEET CONTENTS: FLOOR PLAN
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REVISIONS:	DATE:	SHEET NUMBER
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**FLOOR FINISHES**

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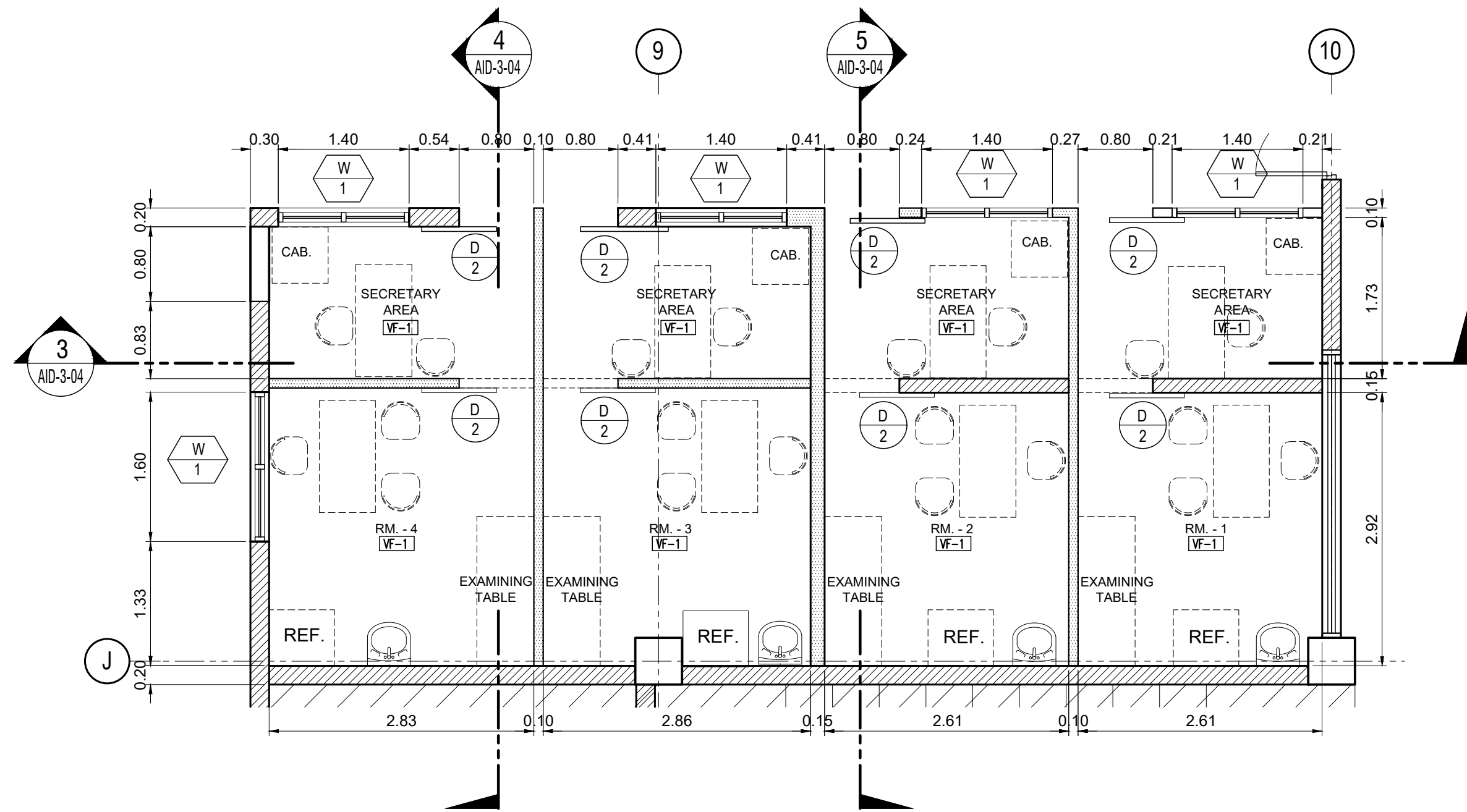
**SYMBOLS**

⊙	RECESSED DOWNLIGHT 6"Ø W/ GLASS DIFFUSER, S-PL18W LAMP FOR NORMAL
—	RECESSED TROFFER - 0.30X1.20, 2-36W FLUORESCENT LAMP W/ ACRYLIC DIFFUSER FOR NORMAL
⊞	RECESSED TROFFER - 600X600MM, 2-20W FLUORESCENT LAMP W/ LOUVER DIFFUSER FOR NORMAL
⊞	RECESSED TROFFER - 600X600MM, 2-20W FLUORESCENT LAMP W/ LOUVER DIFFUSER FOR EMERGENCY

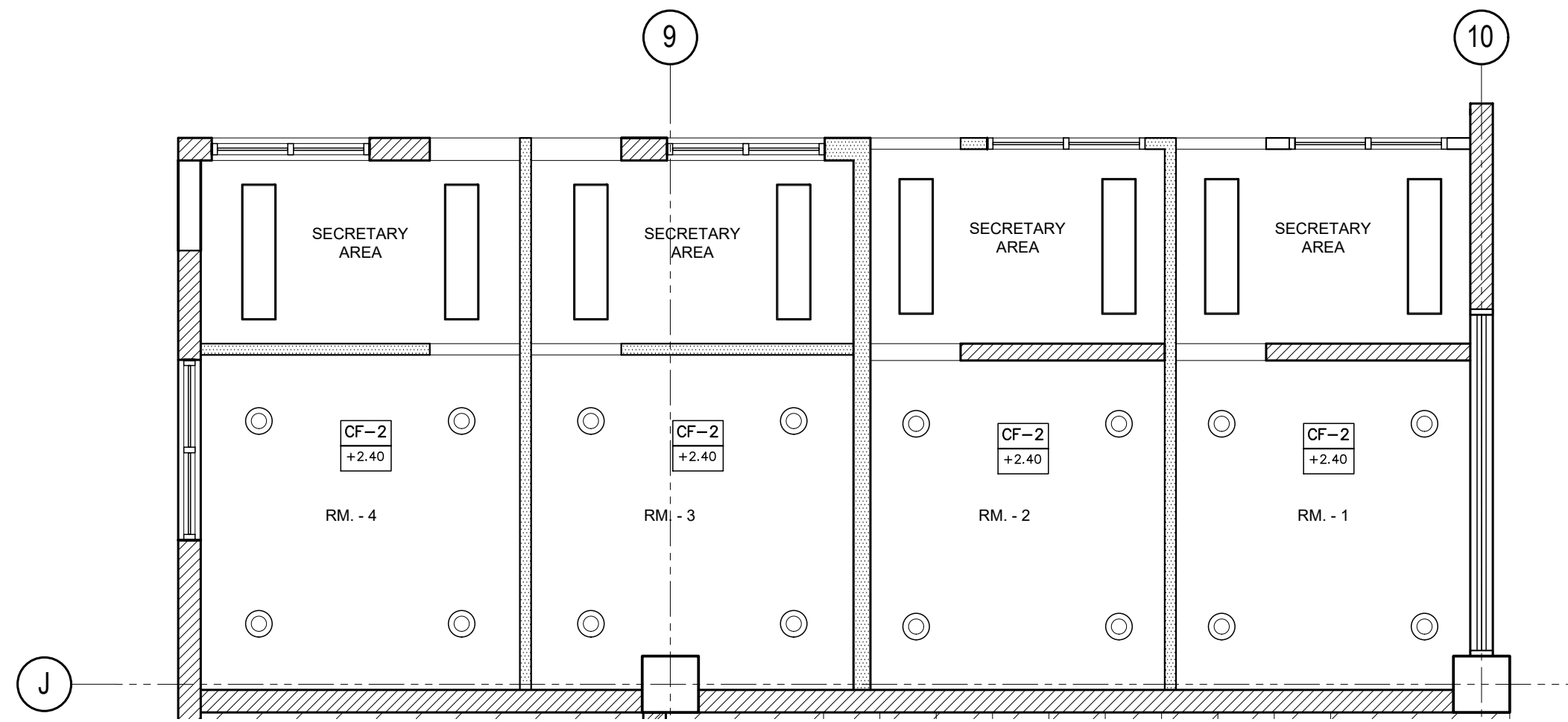
**1 REFLECTED CEILING PLAN**  
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<p><b>OSCAR R. RUIVIVAR &amp; ASSOCIATES</b> ARCHITECTS ENGINEERS INTERIOR DESIGNERS</p> <p>No.26 Widad St. Teresa Village Project 6, Quezon City E-MAIL ADD: orr515.design@gmail.com TEL. 453-92-63/ FAX. 920-16-13</p>	<p>ARCHITECT:</p> <p><b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD</p>	<p>RA 9266, Article IV section 33 Drawings and Specifications and other Contract Documents duly signed, stamped or sealed, as instruments of Service, are the Intellectual Property and Documents of the Architect, whether the object for which they are made is executed or not. It shall be unlawful for any person to duplicate or to make copies of said Documents for use in the repetition of and for other projects or buildings, whether executed partly or in whole, without the written consent of the Architect or Author of said Documents.</p>	<p>CONSULTANT:</p> <p>ENGINEER</p>	<p>PROJECT:</p> <p><b>CONSTRUCTION OF DOCTOR'S PRIVATE CLINIC EXTENSION</b></p>	<p>OWNER:</p> <p> <b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b></p> <p>CONCURRED:</p> <p>JULIUS A. LECCIONES, MD, PhD, DDA, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center</p>	<p>SHEET CONTENTS:</p> <p>REFLECTED CEILING PLAN</p>	<p>REVISIONS:</p> <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>																					<p>DATE:</p>	<p>SHEET NUMBER</p> <p><b>AID-3-03</b></p>
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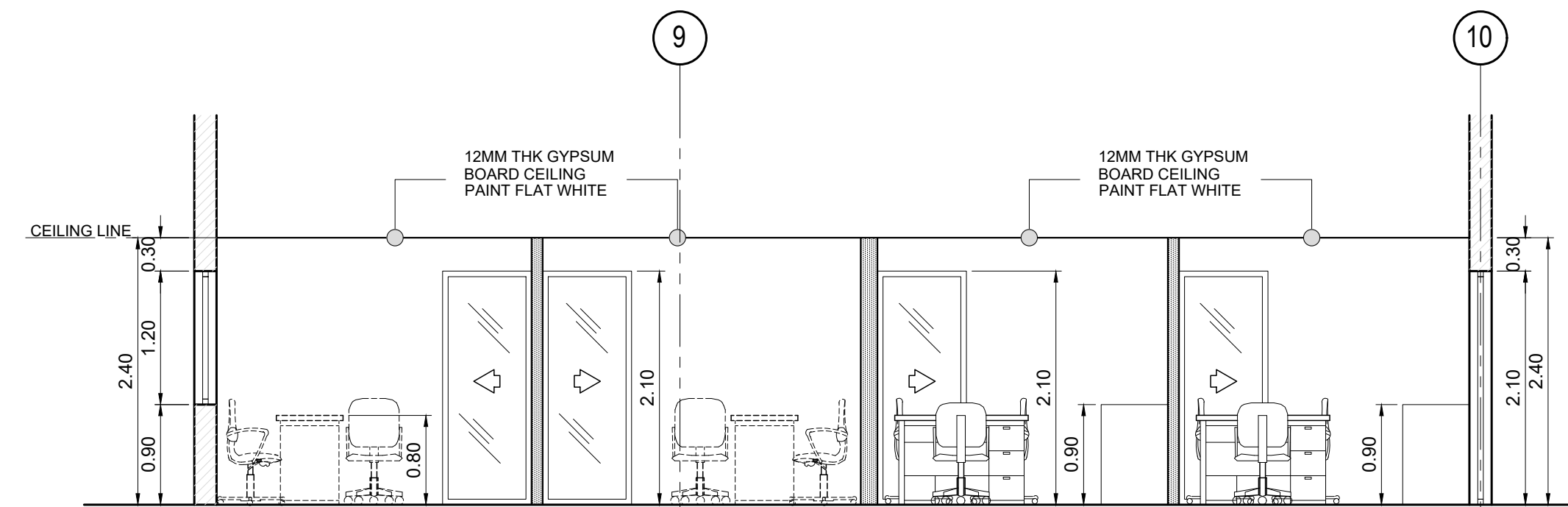
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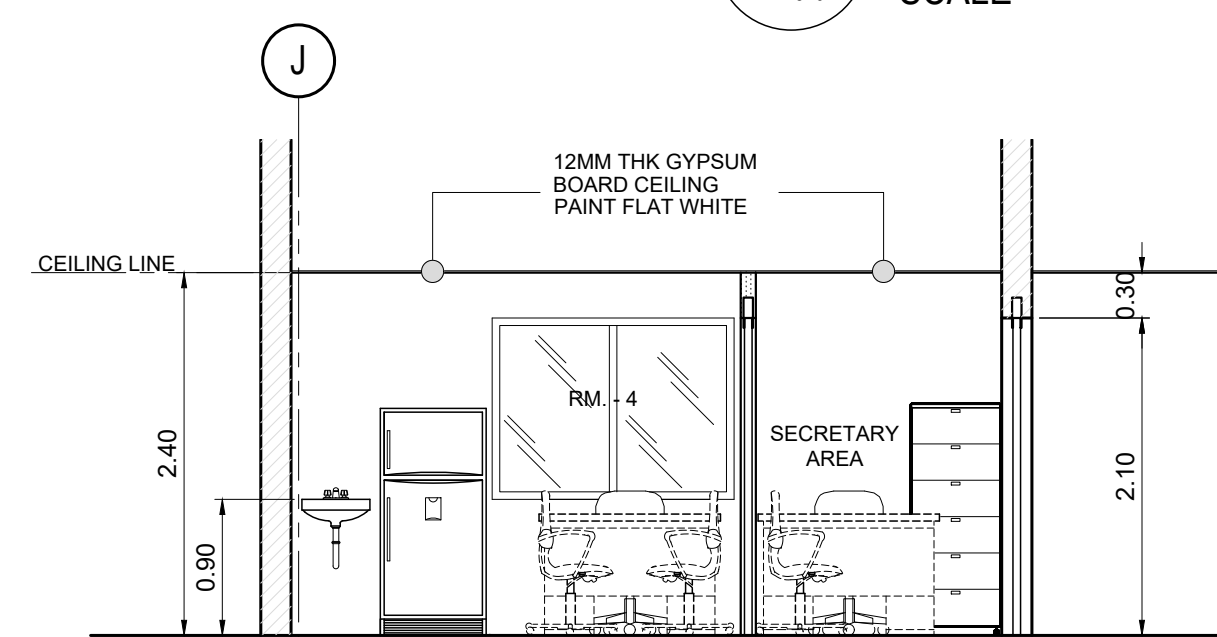
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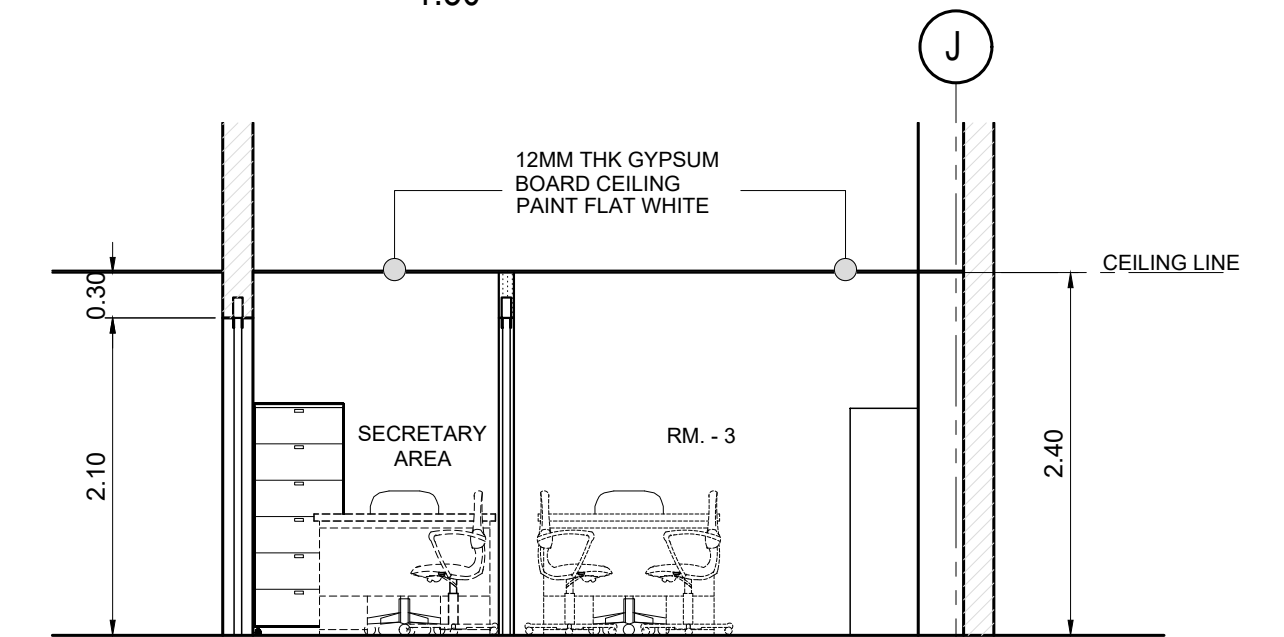
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**4 INTERIOR ELEVATION 2**  
AID-3-04 SCALE 1:50



**5 INTERIOR ELEVATION 3**  
AID-3-04 SCALE 1:50

**OSCAR R. RUIVIVAR & ASSOCIATES**  
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ENGINEER

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LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.

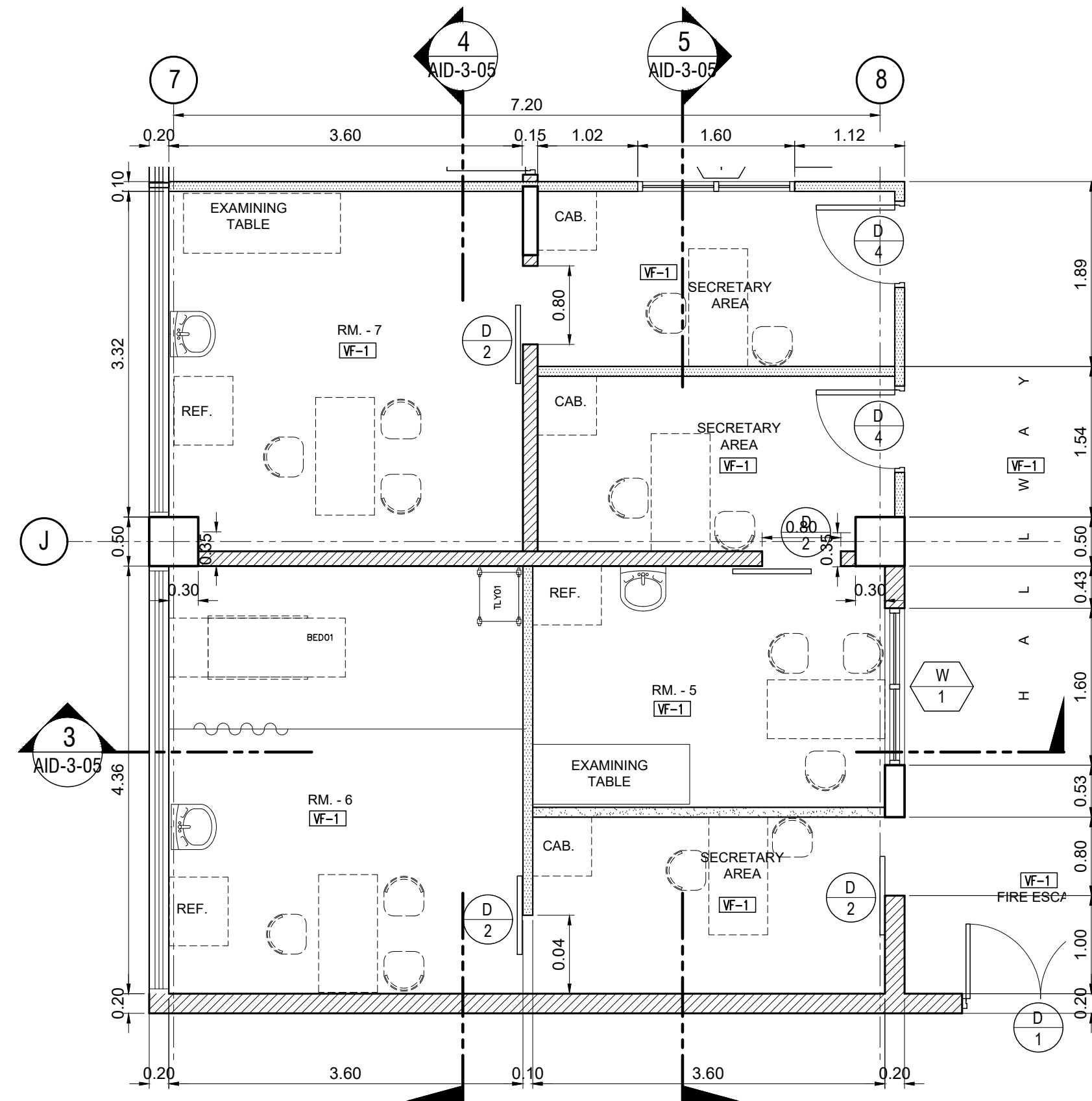
OWNER:  
**PHILIPPINE CHILDREN'S  
MEDICAL CENTER**

CONCURRED:  
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EXECUTIVE DIRECTOR  
Philippine Children's Medical Center

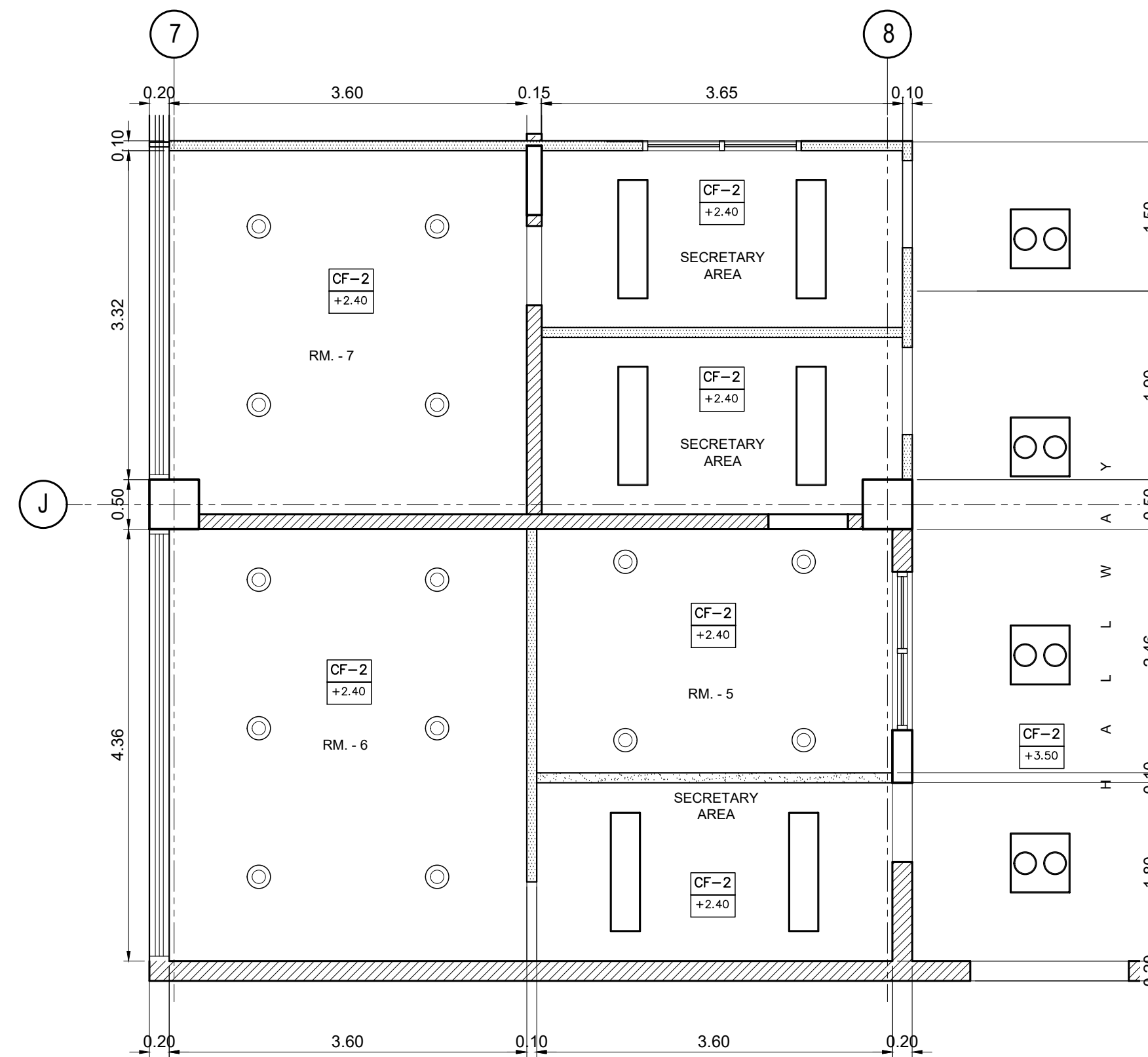
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REFLECTED CEILING PLAN  
INTERIOR ELEVATIONS  
INTERIOR PERSPECTIVES

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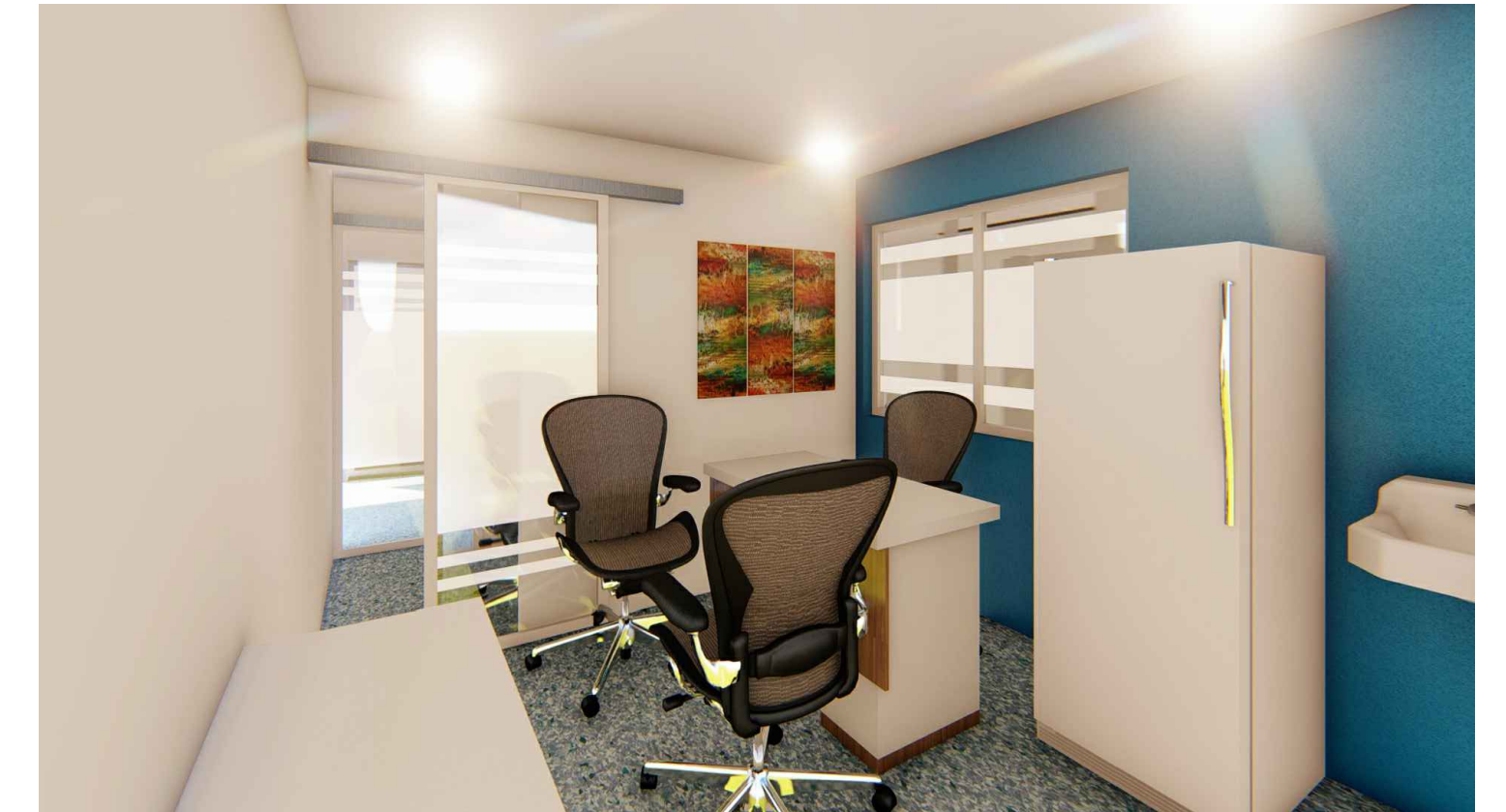
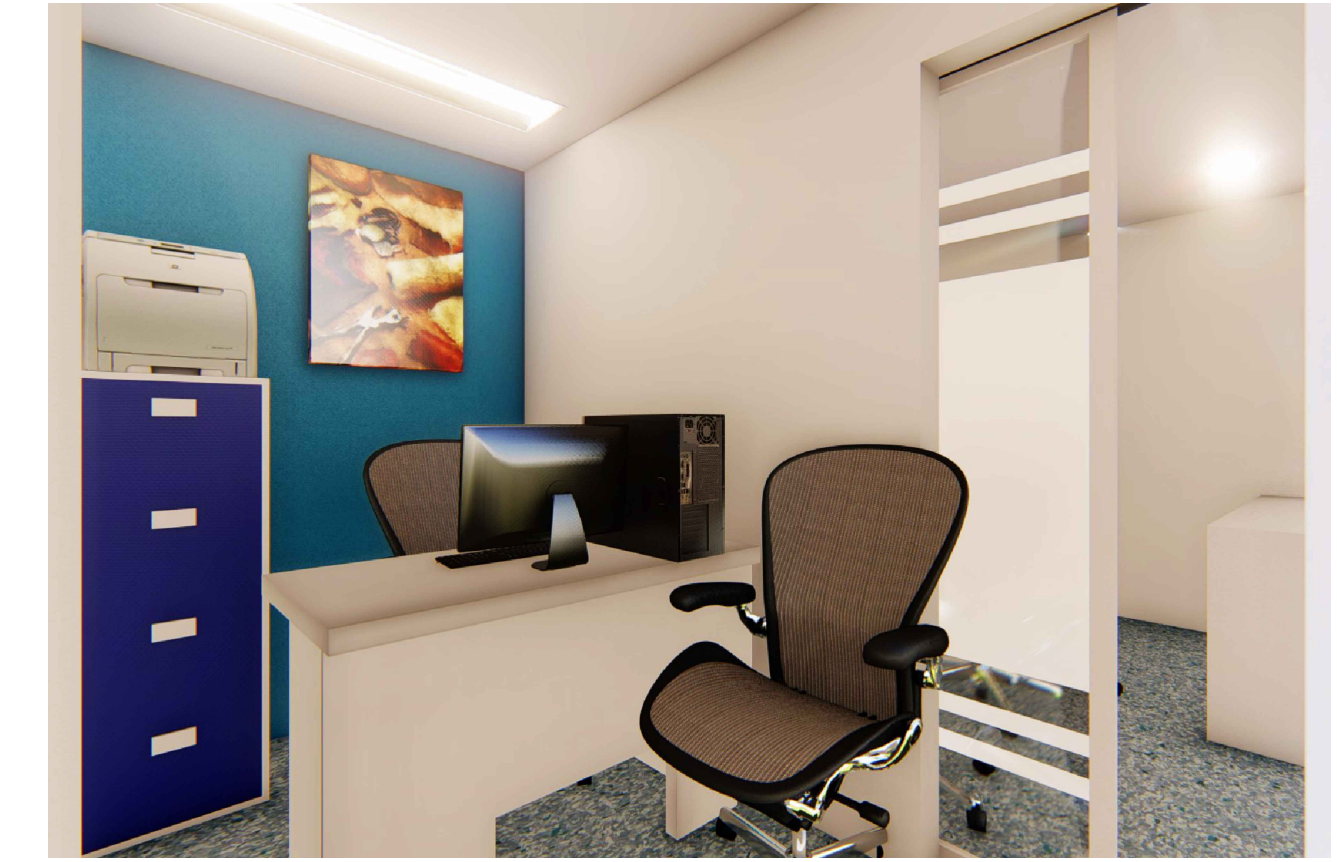




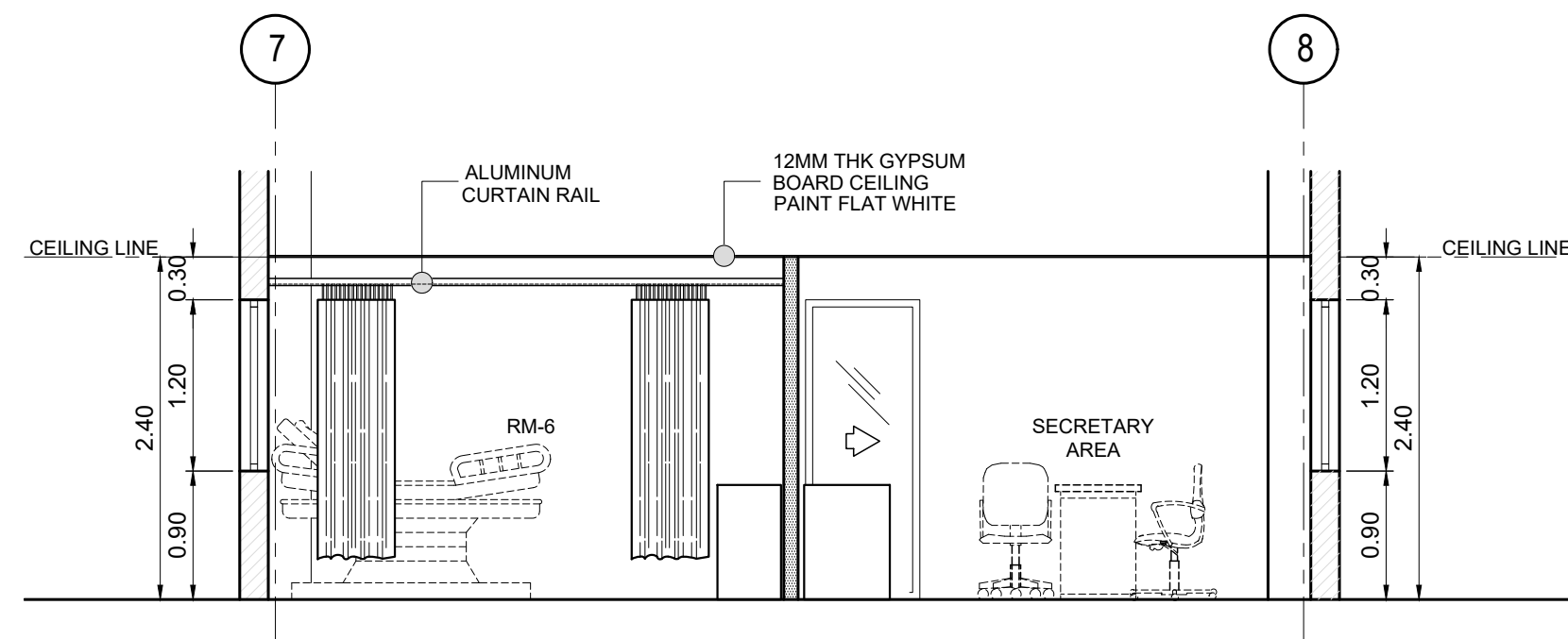
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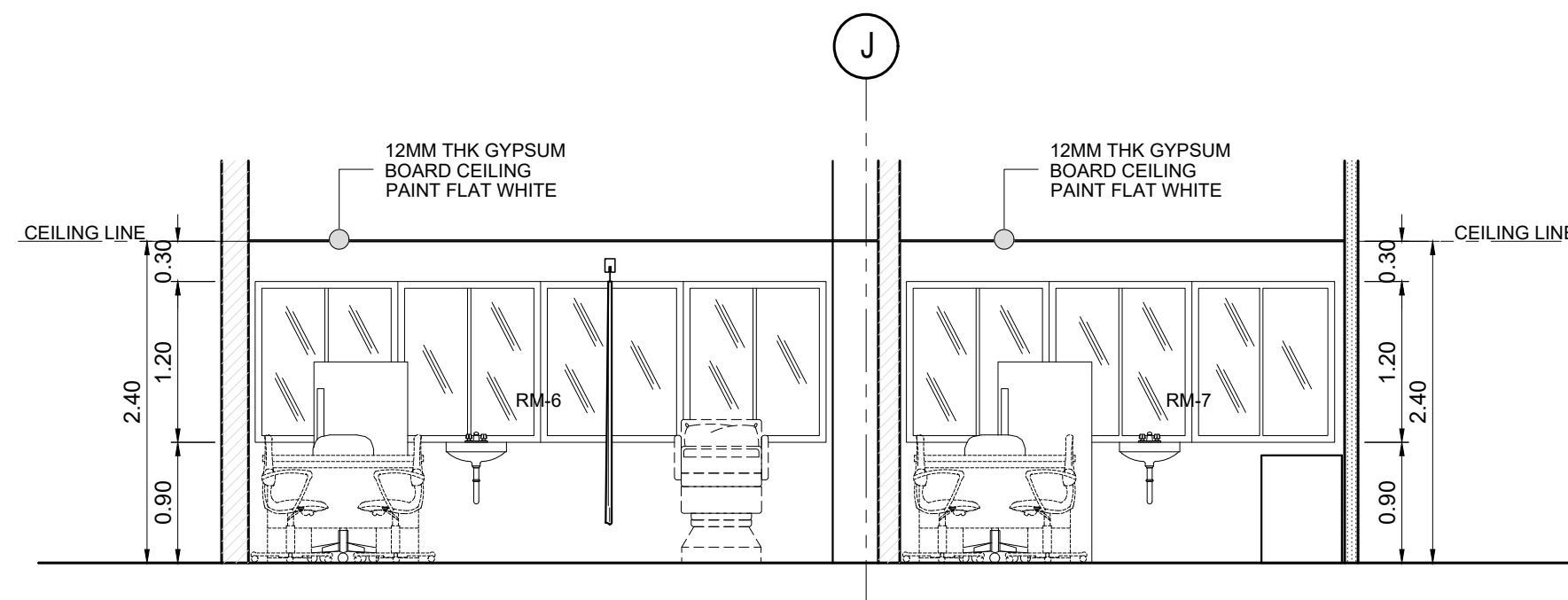
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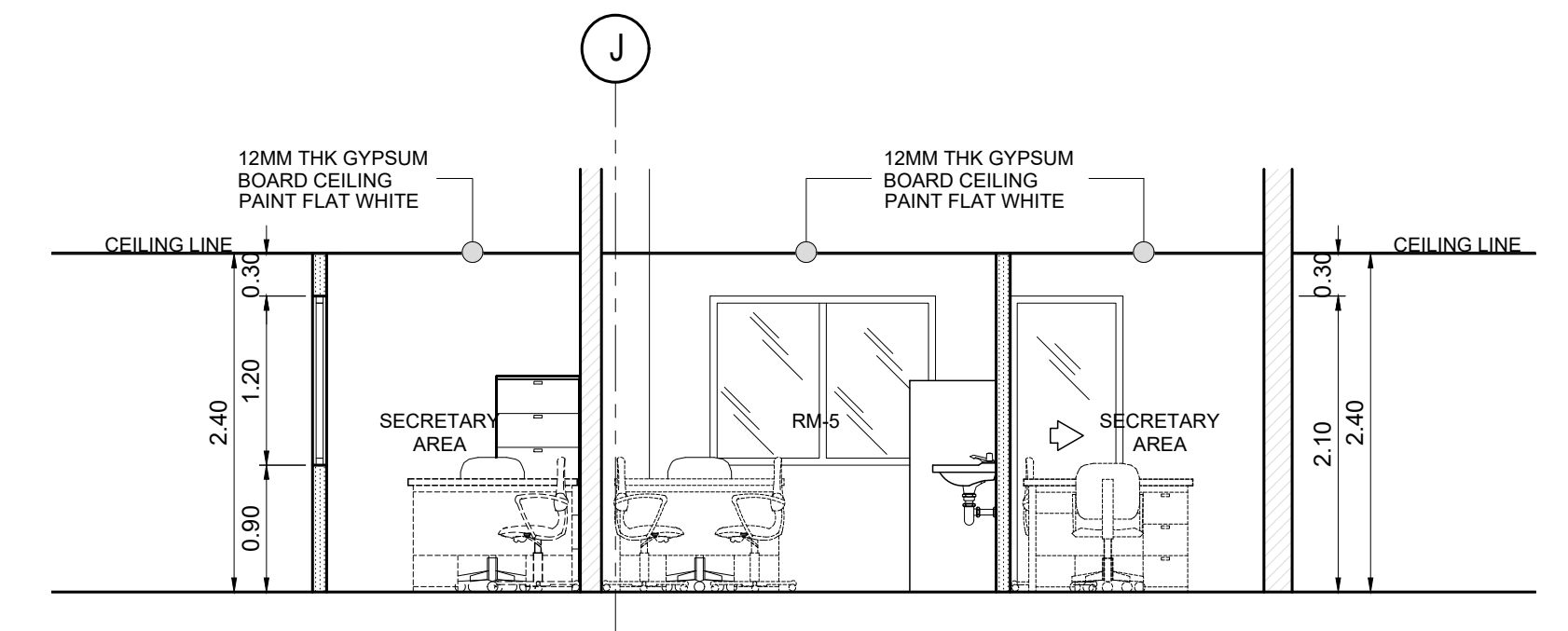
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**4 INTERIOR ELEVATION 2**  
AID-3-05 SCALE 1:50



**5 INTERIOR ELEVATION 3**  
AID-3-05 SCALE 1:50



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CONSULTANT: ENGINEER		PROJECT: <b>CONSTRUCTION OF DOCTOR'S PRIVATE CLINIC EXTENSION</b>
REG.	DATE:	
PTR.	DATE:	
T.J.N.	PLACE:	
	DATE:	

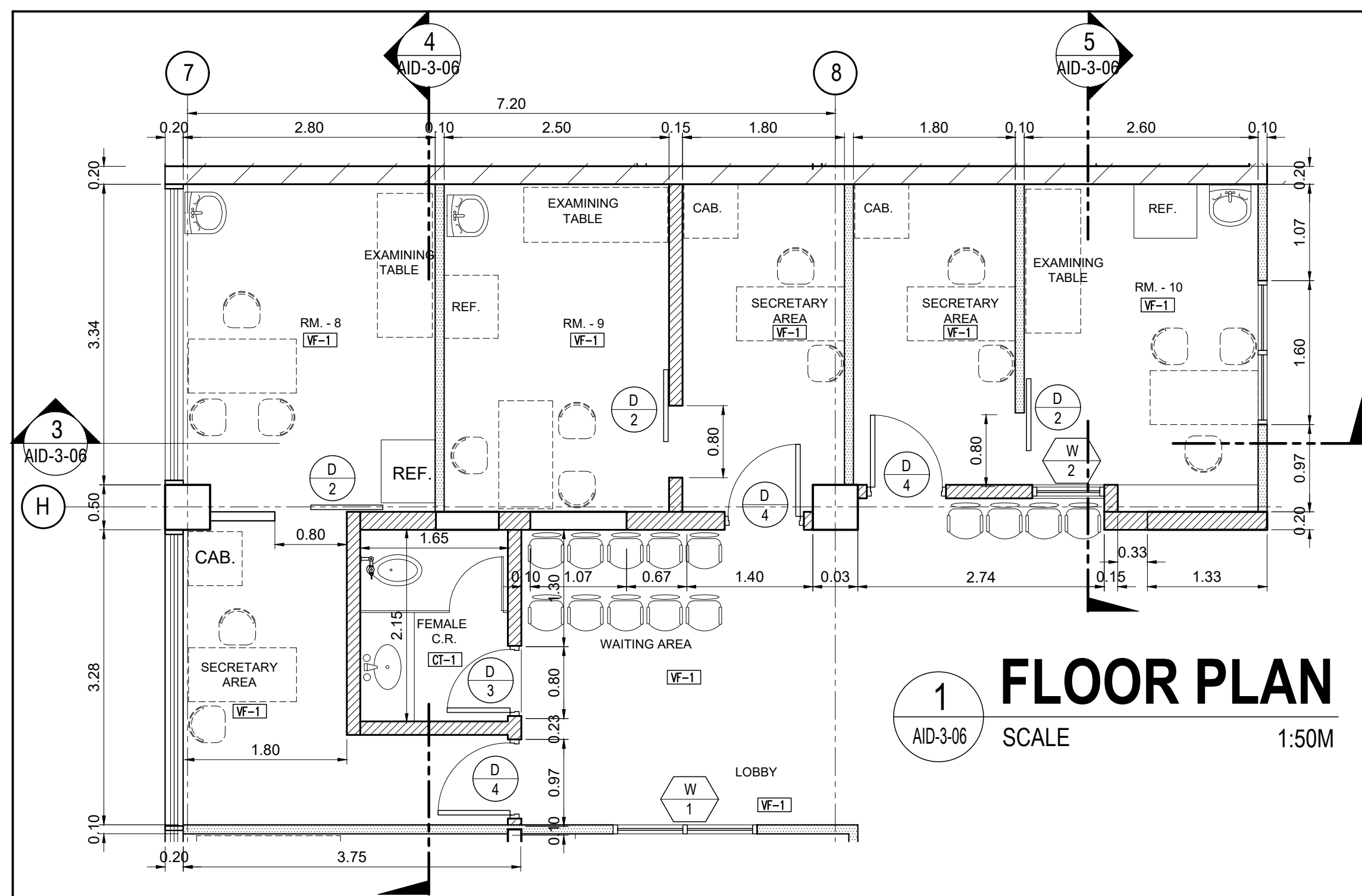
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CONCURRED: JULIUS A. LECCIONES, MD, PhD, DDA, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center		
REVISIONS:		
DATE:		
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LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.		REVISIONS:
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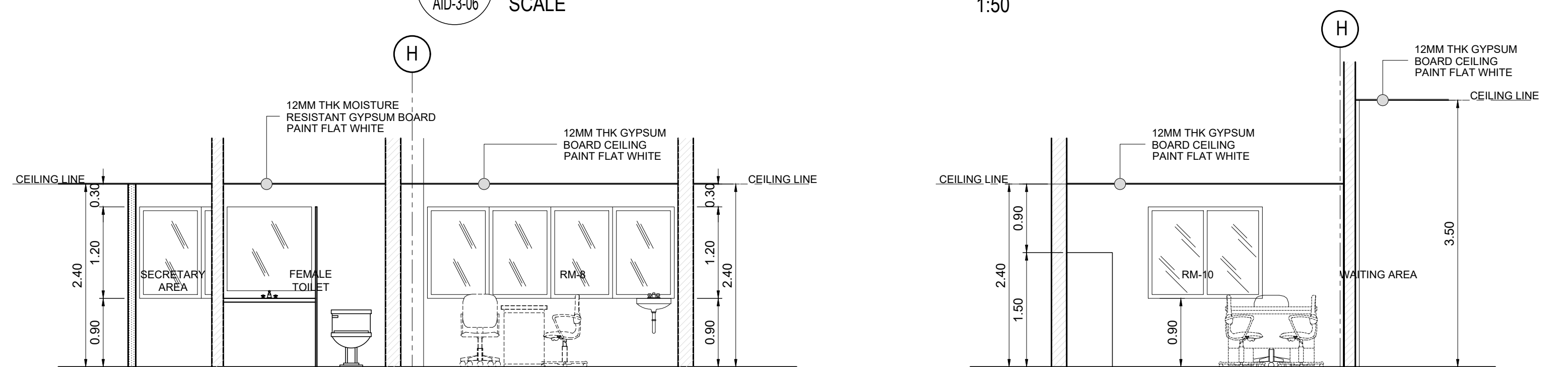
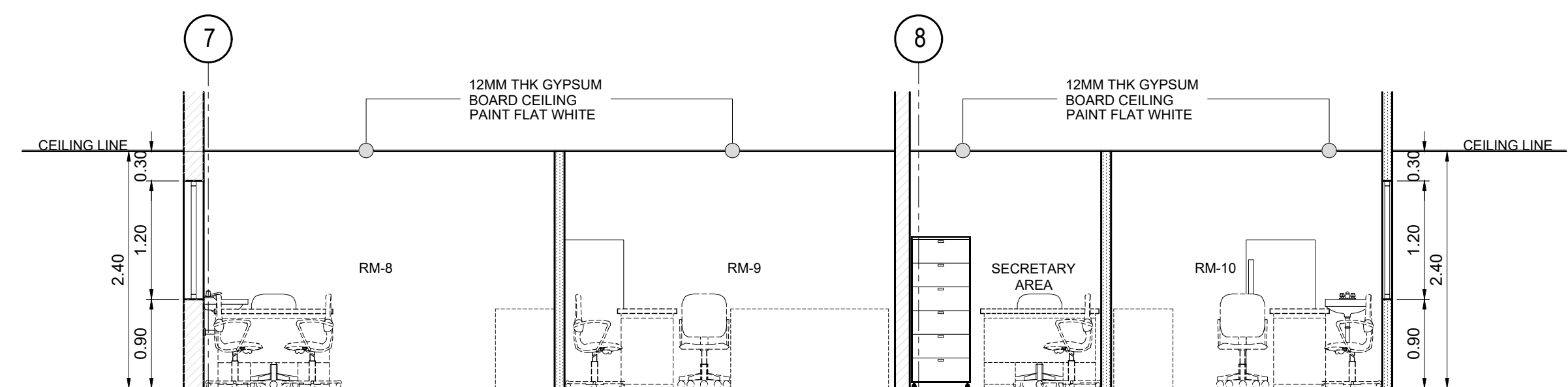
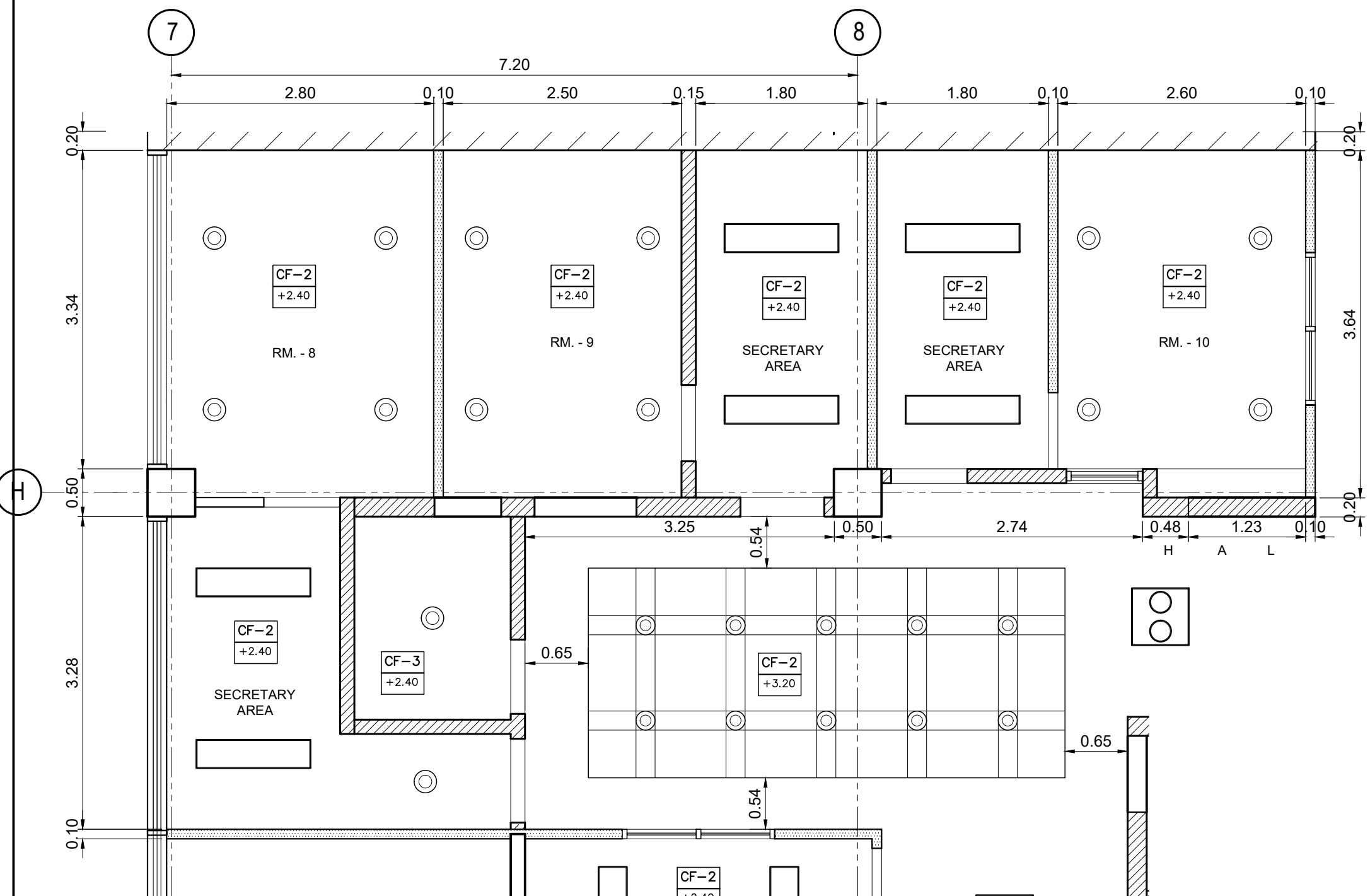
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SCALE:		
DATE:		
SHEET NUMBER		
SHEET NUMBER		

**AID-3-05**





**INTERIOR PERSPECTIVES**



**OSCAR R. RUIVIVAR & ASSOCIATES**  
 ARCHITECTS ENGINEERS INTERIOR DESIGNERS

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LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.

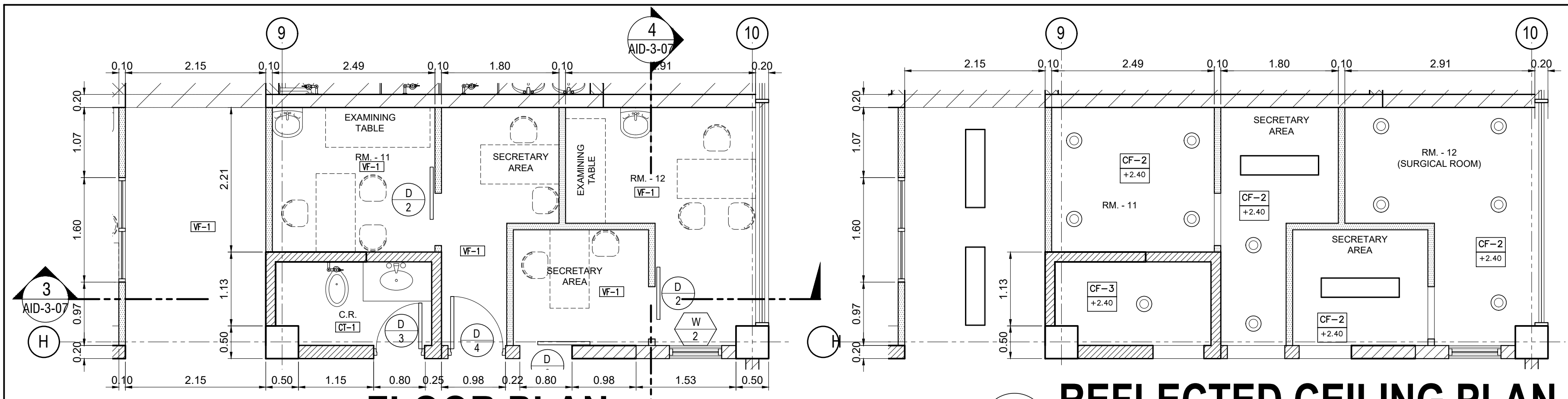
OWNER:  
**PHILIPPINE CHILDREN'S MEDICAL CENTER**

CONCURRED:  
**JULIUS A. LECCIONES, MD, PhD, DDA, CESO III**  
 EXECUTIVE DIRECTOR  
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SHEET CONTENTS:  
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 REFLECTED CEILING PLAN  
 INTERIOR ELEVATIONS  
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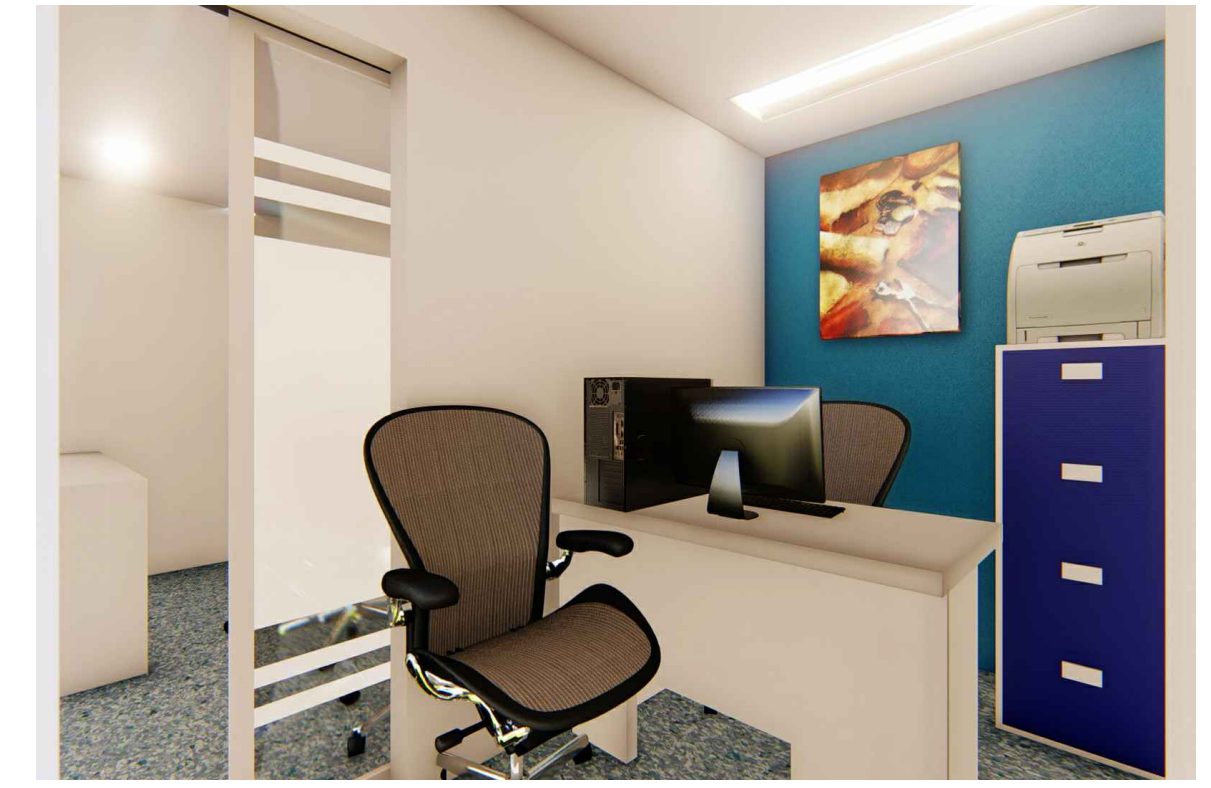
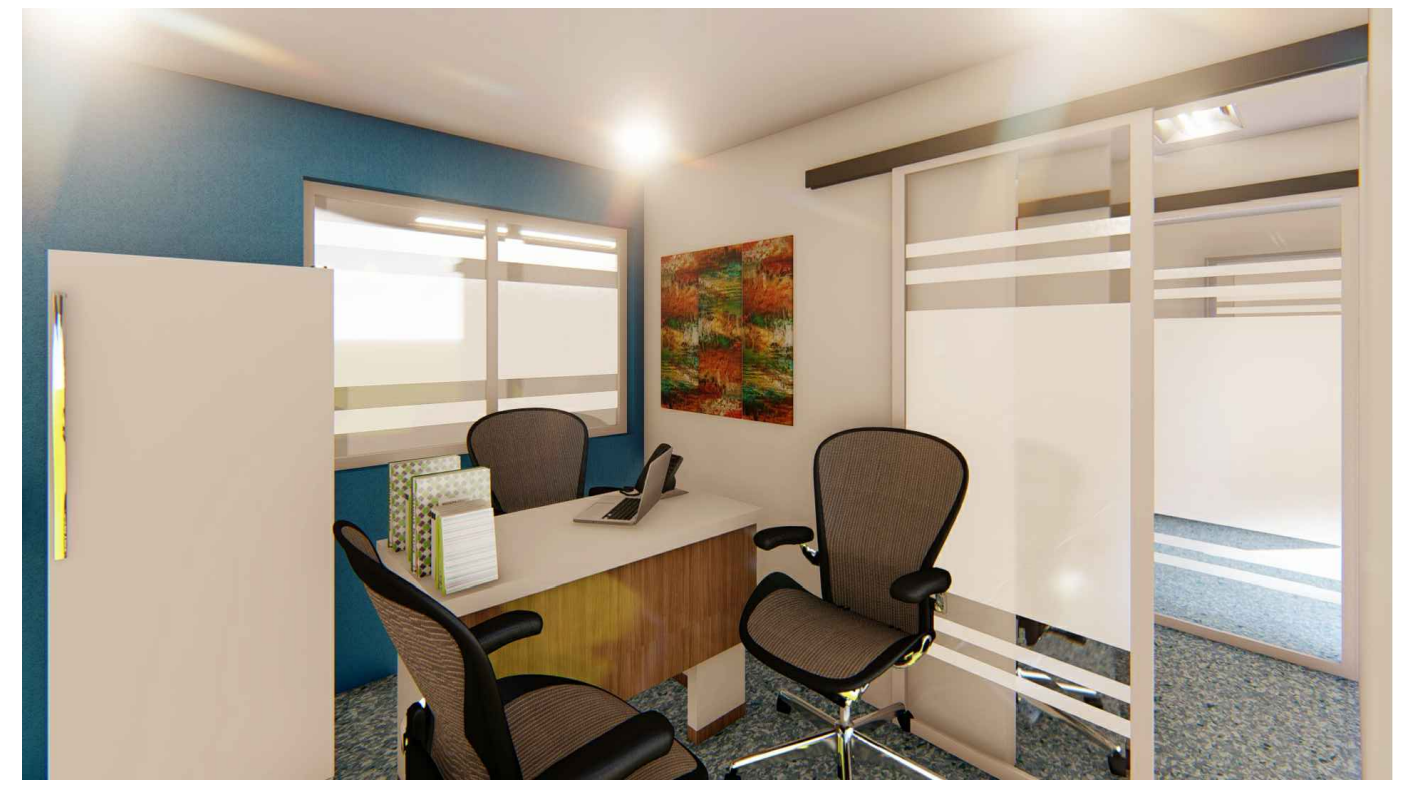
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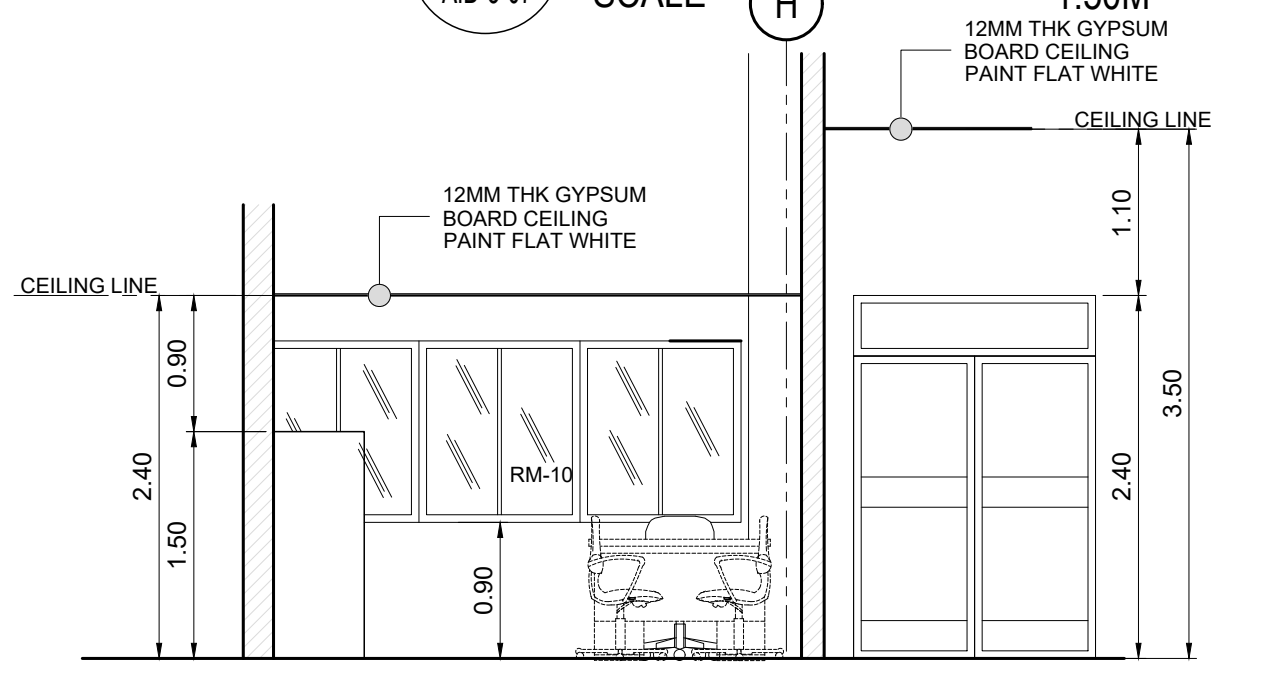


**1 FLOOR PLAN**  
AID-3-07 SCALE 1:50M

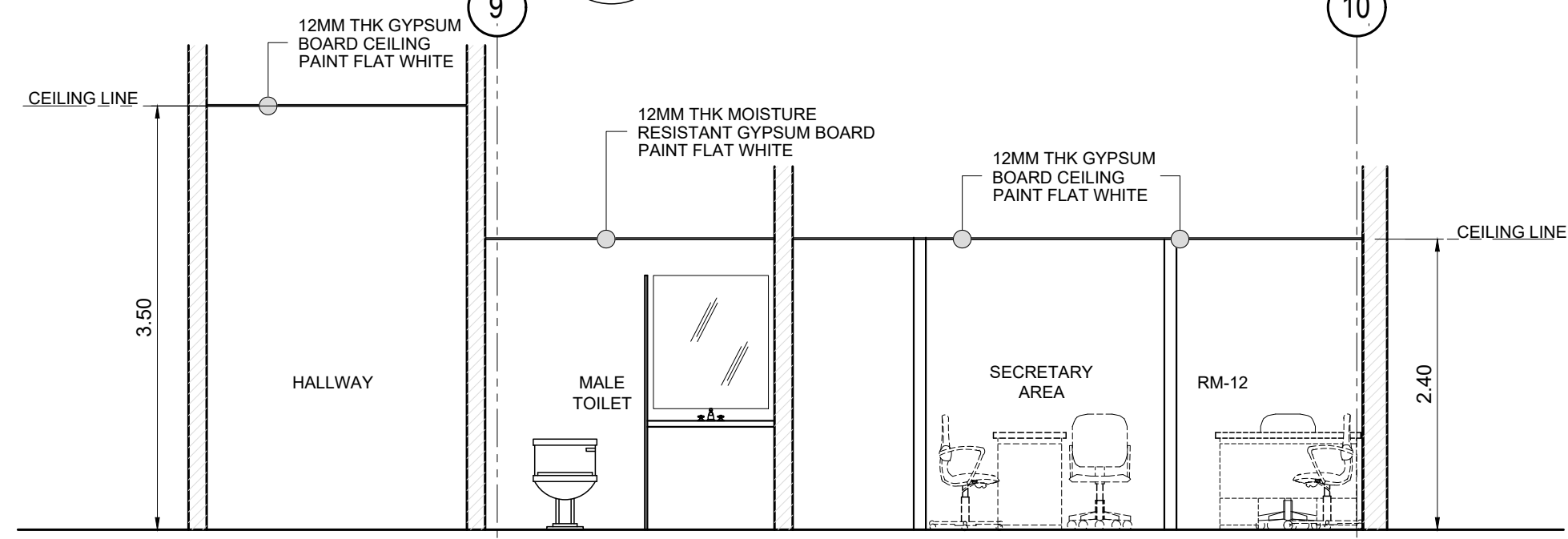
**2 REFLECTED CEILING PLAN**  
AID-3-07 SCALE 1:50M



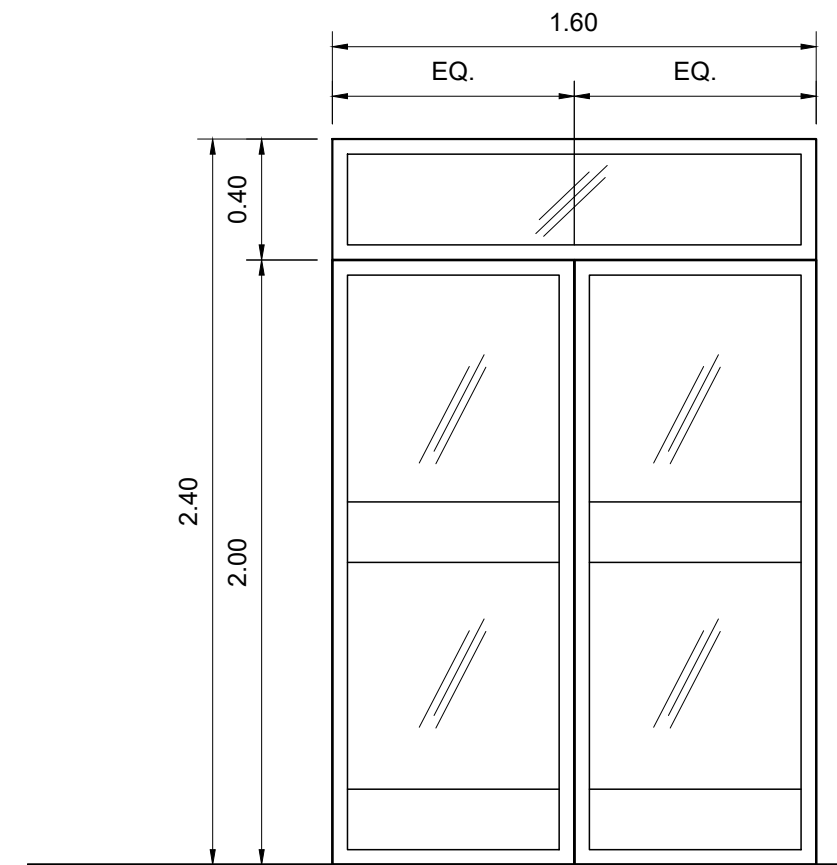
**INTERIOR PERSPECTIVES**  
AID-3-07



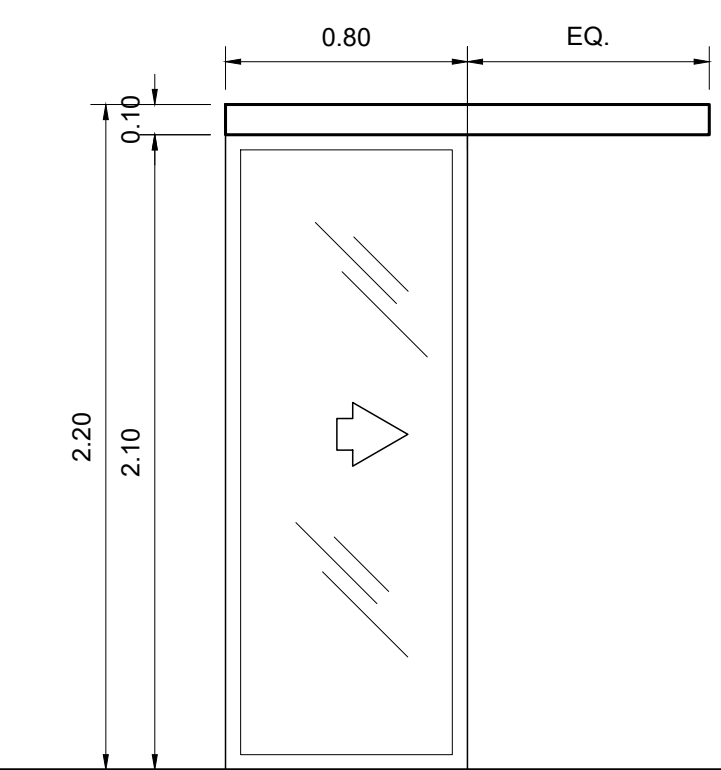
**3 INTERIOR ELEVATION 1**  
AID-3-07 SCALE 1:50



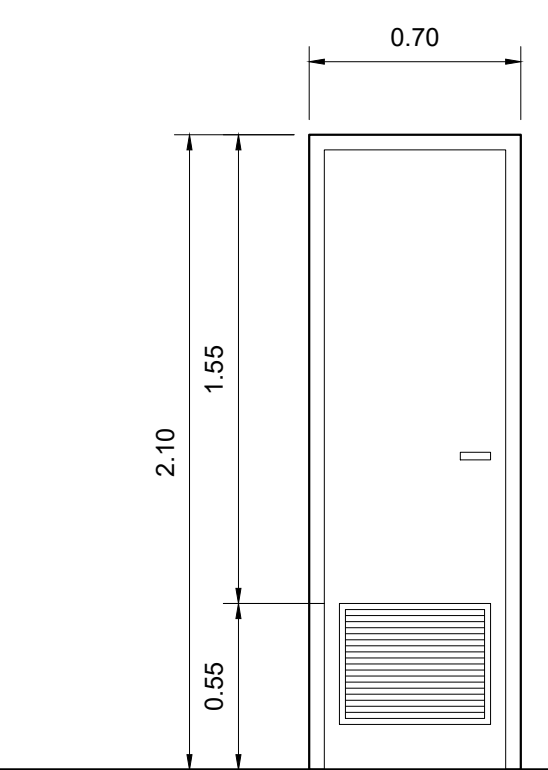
**4 INTERIOR ELEVATION 2**  
AID-3-07 SCALE 1:50



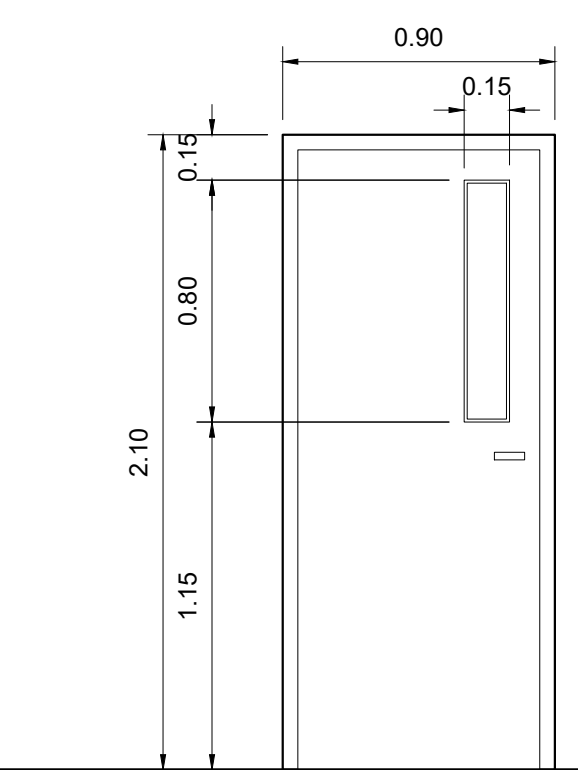
**D 1** 2400 x 1600 DOUBLE-SWING GLASS DOOR IN ALUMINUM POWDER COATED FRAME WITH TRANSOM WINDOW, SS PUSH & KICK PLATES



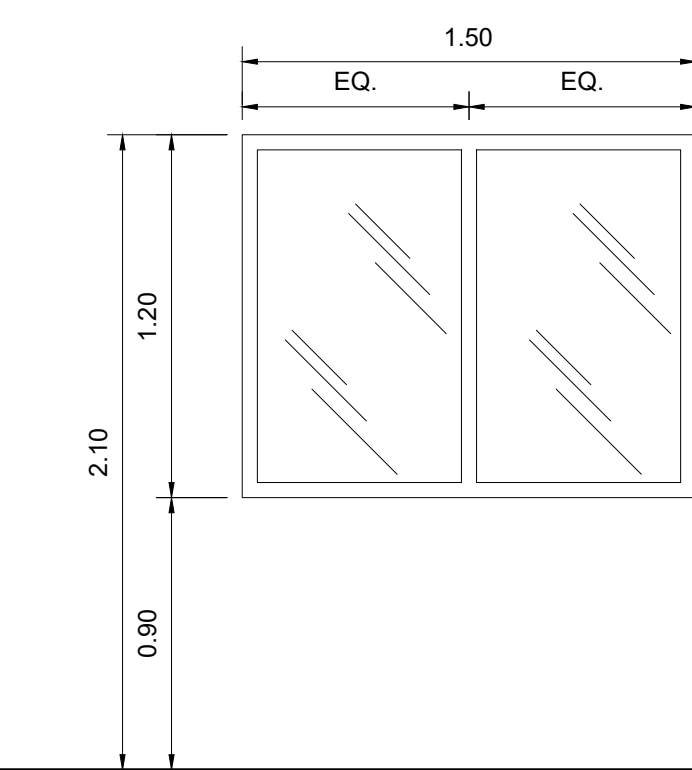
**D 2** 2100 x 800 SLIDING GLASS DOOR IN ALUMINUM POWDER COATED FRAME



**D 3** 2100 x 700 SINGLE SWING FLUSH DOOR WITH LOUVERS



**D 4** 2100 x 800 SINGLE SWING FLUSH DOOR WITH VIEWING GLASS



**W 1** 1500 X 1200 SLIDING WINDOW IN ALUMINUM POWDER COATED FRAME

**5 SCHEDULE OF DOORS AND WINDOWS**  
AID-3-07 SCALE 1:25M

<p><b>OSCAR R. RUIVIVAR &amp; ASSOCIATES</b> ARCHITECTS ENGINEERS INTERIOR DESIGNERS</p> <p>No.26 Wisdom St. Teresa Village Project 6, Quezon City E-MAIL ADD: orr515.design@gmail.com TEL. 453-92-63/ FAX. 920-16-13</p>	<p>ARCHITECT: <b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD</p>	<p>RA 9266, Article IV section 33 Drawings and Specifications and other Contract Documents duly signed, stamped or sealed, as instruments of Service, are the Intellectual Property and Documents of the Architect, whether the object for which they are made is executed or not. It shall be unlawful for any person to duplicate or to make copies of said Documents for use in the repetition of and for other projects or buildings, whether executed partly or in whole, without the written consent of the Architect or Author of said Documents.</p>	<p>CONSULTANT:  ENGINEER</p>	<p>PROJECT:  CONSTRUCTION OF DOCTOR'S PRIVATE CLINIC EXTENSION</p>	<p>OWNER:  <b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b></p>	<p>SHEET CONTENTS: BLOWN-UP PLAN REFLECTED CEILING PLAN INTERIOR ELEVATIONS INTERIOR PERSPECTIVES SCHEDULE OF DOORS SCHEDULE OF WINDOWS</p>	<p>REVISIONS:</p> <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>																					<p>DATE:</p>	<p>SHEET NUMBER <b>AID-3-07</b></p>
<p>REG. NO. 5713      VALID UNTIL: 5-15-21 PTR. NO. 7324412      DATE: 01-04-19 T.J.N. NO. 113-604-561      PLACE: QUEZON CITY IAPDANO: 01937 250805 021119      DATE: 06-30-19</p>	<p>REG.      DATE: PTR.      DATE: T.J.N.      PLACE:</p>	<p>LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.</p>	<p>CONCURRED:  JULIUS A. LECCIONES, MD, PhD, DDA, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center</p>	<p>ISSUE DATE:</p>	<p>DRAWN BY: SCALE:</p>																								



**GENERAL NOTES:**

- ALL MECHANICAL WORKS SHALL BE DONE IN ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE PHILIPPINE BUILDING CODE REGULATIONS.
- THE TOTAL SCOPE OF WORK SHALL INCLUDE ALL WORKS DESCRIBED IN THE PLAN AND IN THE GENERAL PROVISIONS OF THE INSTRUCTION TO BIDDERS FOR MECHANICAL WORKS.
- AIR CONDITIONED SPACE IS DESIGNED AT 22°C ± 1' WITH 55% ± 5% RH.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS INDICATING ACTUAL EQUIPMENT DIMENSIONS AND PROVISIONS FOR THE DUCT PASSAGES THRU WALLS, FLOORS AND ROOFS SHALL BE COORDINATED IN ADVANCE WITH THE INTERIOR DESIGNER/CONTRACTOR.
- INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. IN CASE OF SUBSTITUTION OF EQUIPMENT/MATERIALS, SUBMIT BROCHURES, LITERATURES TO THE ARCHITECT FOR APPROVAL.
- ALL A/C DUCTWORKS SHALL BE CONSTRUCTED AND INSTALLED AS PER LATEST SMACNA STANDARD.
- ALL MATERIALS SHALL BE CLEAN AND NEW. SEALED DUCTWORKS FORM THE INSIDE WHEN EVER POSSIBLE.
- ALL A/C DUCTWORKS SHALL BE INSULATED WITH 25MM THICK FIBERGLASS WITH ALUMINUM VAPOR BARRIER, 32KGS/CU.M.
- ALL KITCHEN EXHAUST DUCT SHALL BE CONSTRUCTED WITH B.I. SHEET GA 16, INSULATED WITH 50MM THICK GLASS FIBER WITH ALUMINUM VAPOR BARRIER, 32KGS/CU.M.
- FLEXIBLE DUCT SHALL BE PROVIDED TO CONNECT A/C DUCT TO FCU.
- ALL EQUIPMENT HANGERS SHALL BE PROVIDED WITH VIBRATION ISOLATOR AND CATWALK FOR SERVICING AND MAINTENANCE.
- FLEXIBLE ROUND DUCT SHALL BE INSTALLED NOT MORE THAN 1500MM FROM RIGID DUCTWORKS.
- PROVIDE ACCESS MAN HOLES FOR FCU MAINTENANCE. LOCATION SHALL BE APPROVED BY ARCHITECT.
- ALL ELECTRICAL WORKS SHALL BE DONE IN ACCORDANCE WITH THE PROVISIONS OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE, THE LAWS & ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITIES.
- CONTROL AND LOADSIDE ELECTRICAL FIELD WIRING SHALL BE DONE FOR A/C AND VENTILATION EQUIPMENT.
- TEST DUCT FOR LEAKAGES. THE CONTRACTOR SHALL TEST, BALANCE AND COMMISSION THE ENTIRE INSTALLATION.
- CHECK AND CALCULATE APPROPRIATE BLOWER SUPPORT BASE ON OPERATING WEIGHT OF SUPPLIED EQUIPMENT. ALSO CHECK IF STRUCTURAL SUPPORT IS ADEQUATE TO CARRY THE EQUIPMENT AND ITS SUPPORTS.
- CHECK SITE FOR THE AVAILABILITY OF 2-WAY VALVE AND ROOM THERMOSTAT. INSTALL ROOM THERMOSTAT NEAR THE RETURN OF FCU'S.
- ALL NECESSARY GOVERNMENT PERMITS SHALL BE SECURED AND BORNE BY THE CONTRACTOR. SUBMIT 7 SETS OF AS-BUILT PLANS (SIGNED & SEALED) & E-FILE TO THE OWNER. THE CONTRACTOR SHALL SECURE PERMIT TO OPERATE.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. DETAILED DRAWINGS ONLY INDICATED DIMENSION AND METHODS AND ARE NOT DRAWN TO SCALE.

**LEGEND & SYMBOLS:**

ABB.	DESCRIPTION
	CEILING CASSETTE EXHAUST FAN
	CEILING TYPE RE-CIRCULATING AXIAL FAN
	FLOOR MOUNTED TYPE FAN COIL UNIT
	CEILING MOUNTED TYPE FAN COIL UNIT
	NEW AIR DUCT WITH SIZE
	EXHAUST AIR GRILLE
	VOLUME DAMPER / BACK DRAFT DAMPER
	EQUIPMENT TAG
	90° ELBOW / 45° ELBOW
	CONCENTRIC TRANSITION
	SIDE COLLAR
	AIR VANE

**ABBREVIATIONS:**

ABB.	DESCRIPTION
FCU	FAN COIL UNIT
EF	EXHAUST FAN
Kw	KILO WATT
FAD	FRESH AIR DUCT
EAD	EXHAUST AIR DUCT
FAG	FRESH AIR GRILLE
EAG	EXHAUST AIR GRILLE
MM	MILLIMETERS

**SPLIT TYPE AIR-CONDITIONING UNITS (AIR COOLED CONDENSING UNIT)**

EQUIPMENT TAG	QTY.	AREA SERVED	COOLING CAPACITY		AIR FLOW CAPACITY		TOTAL S.P. (Pa)	FAN COIL UNIT DESCRIPTION	POWER INPUT (KW)	ELECTRICAL CHARACTERISTICS			OUTDOOR UNIT TYPE
			MBH	TR	CFM	CMH				VOLTS	PHASE	HERTZ	
FCU/ACCU-SW2	AS SHOWN	AS SHOWN	24.0	2.0	400	680	-	WALL MOUNTED TYPE	2.5	220	1	60	AIR COOLED CONDENSING UNIT
FCU/ACCU-SC5	AS SHOWN	AS SHOWN	60.0	5.0	1500	2550	-	CEILING CASSETTE TYPE	6.5	220	3	60	

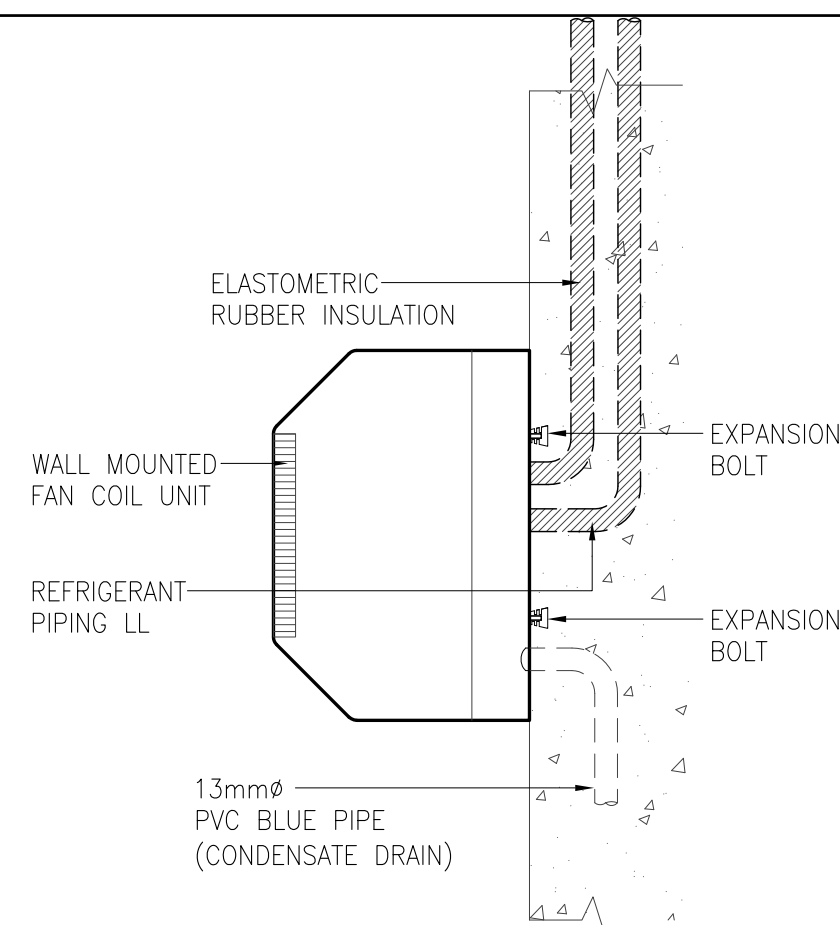
**FANS:**

EQUIPMENT TAG	QTY.	AREA SERVED	AIR FLOW CAPACITY		TOTAL S.P. (Pa)	POWER INPUT (KW)	ELECTRICAL CHARACTERISTICS			UNIT DESCRIPTION
			CFM	CMH			VOLTS	PHASE	HERTZ	
TEF-1	2	TOILET ROOM	80	85	100	0.080	220	1	60	CEILING CASSETTE EXHAUST FAN
EF-1	12	SECRETARY ROOM	200	340	150	0.125	220	1	60	CEILING CASSETTE EXHAUST FAN

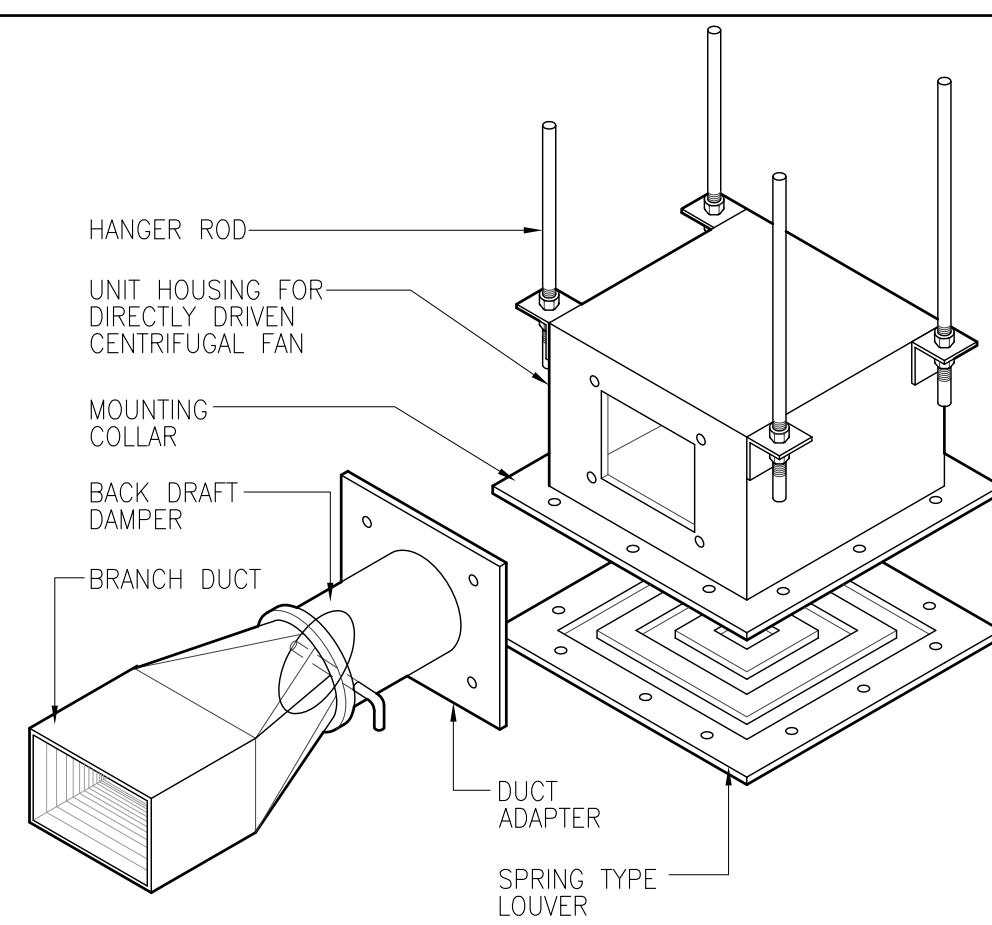
**MATERIAL SPECIFICATIONS:**

MATERIALS	SPECIFICATIONS	MATERIALS	SPECIFICATIONS
01. DUCTWORKS. SHEET METAL	SAD : U.S. STD GALVANIZED IRON	10. DRAIN PIPE INSULATION	CLOSED CELL RUBBER, 12MM THK.
02. DUCT INSULATION	SAD : FIBER GLASS 25MM THK., 48 KG/CU.M, W/ AVB.	11. ELECTRICAL WIRE	STRANDED, THWN/THHN. "PHELPS DODGE"
03. DUCT INS. ADHESIVE	NON- FLAMMABLE.	12. ELECTRICAL CONDUIT	INDOOR : E M T "MATSUSHITA" OUTDOOR : I M C "MATSUSHITA"
04. DUCT STRAP	PLASTIC, 19MM WIDE.	13. FLEX. ELECTRICAL	INDOOR : METALLIC ORDINARY
05. DUCT TAPE	ALUMINUM, 75MM WIDE	14. CONDUIT	OUTDOOR : LIQUID TIGHT FLEXIBLE & FITTINGS
06. DUCT SEALANT	NON-FLAMABLE, WATER BASE SEALANT	15. CIRCUIT BREAKERS	208/230V, 3ø, 60HZ, NEMA 3R ENCL., "GE"
07. CONDENSING WATER PIPES	B.I. PIPES SCHEDULE 40	16. AHU CONTROLLER	DUCT MOUNTED THERMOSTAT AT THE RETURN
08. ELBOWS	B.I. PIPES SCHEDULE 40		
09. REF. PIPE INSULATION	CLOSED CELL RUBBER, 25MM THK.		

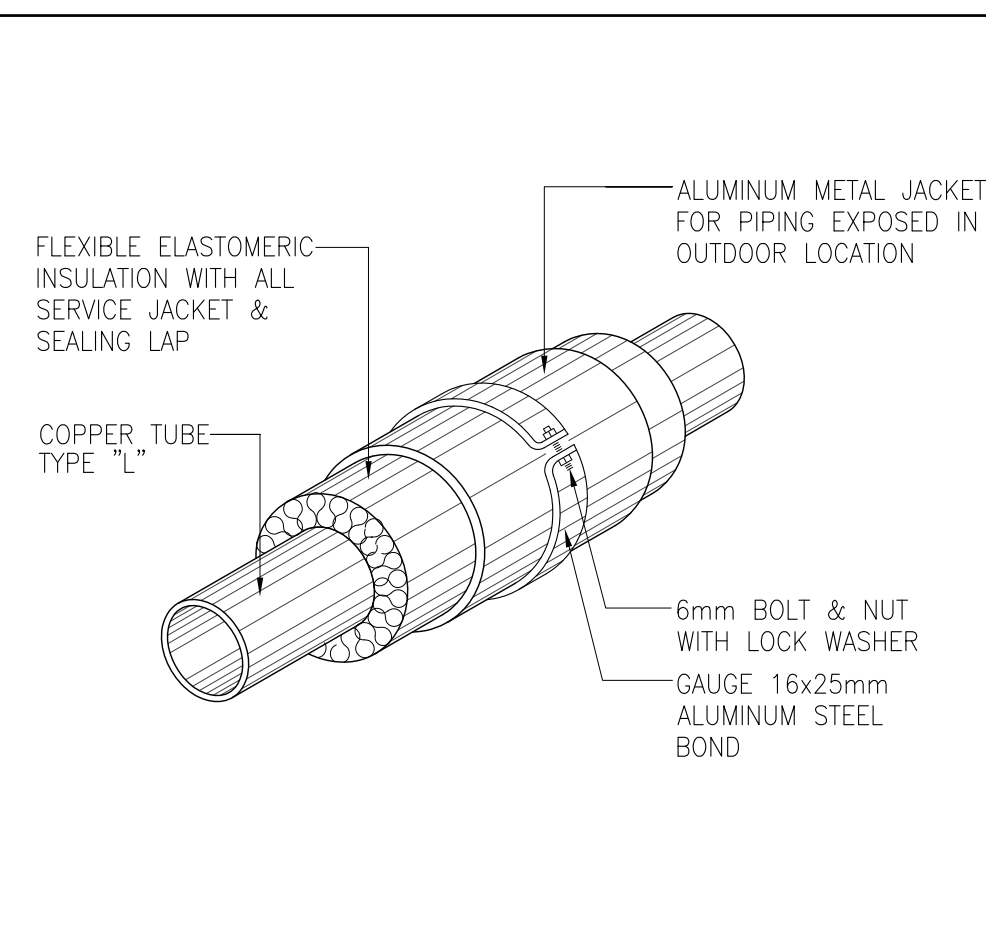
- FCU SHALL HAVE SECONDARY DRAIN PANS WITH SUFFICIENT INSULATION AND PROTECTIVE PAINT.
- PIPE ALL FCU DRAIN TO NEAREST PIPE DRAIN PROVISION PROVIDED BY SANITARY.
- PROVIDE P-TRAP FOR FCU CONDENSATE DRAIN.
- FULLY INSULATE FCU CONDENSATE DRAIN PIPE.



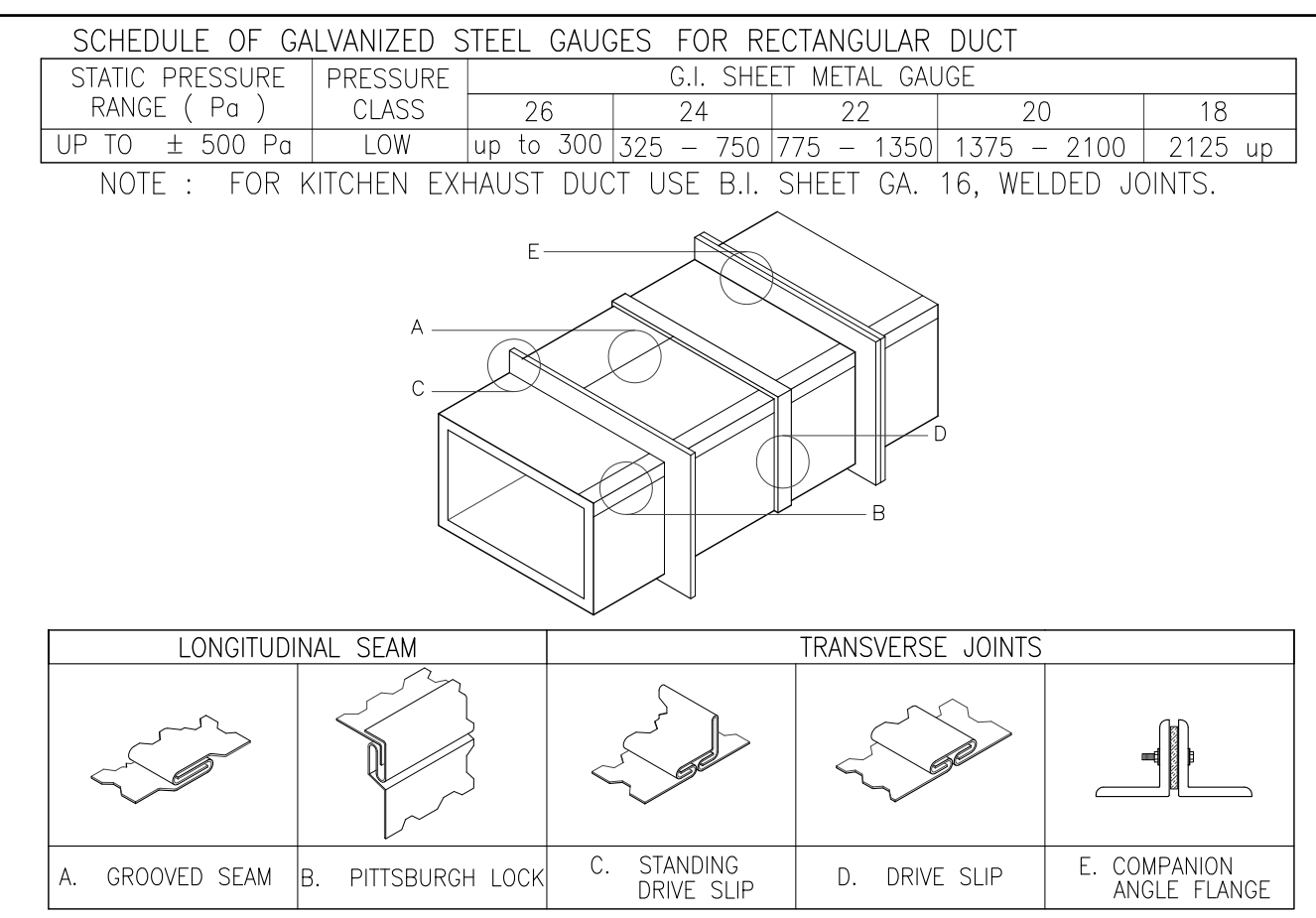
**1 WALL MOUNTED FCU DETAIL**  
M-01 NTS



**2 CEILING CASSETTE FAN DETAIL**  
M-01 NTS



**3 REF. PIPE INSULATION DETAIL**  
M-01 NTS



**4 DUCTS JOINTS AND SEAM DETAIL**  
M-01 NTS

<p>OSCAR R. RUIVIVAR &amp; ASSOCIATES ARCHITECTS ENGINEERS INTERIOR DESIGNERS No.26 Wisdom St. Teresa Village Project 6, Quezon City E-MAIL ADD: orr515.design@gmail.com TEL. 453-92-63/ FAX. 920-16-13</p>	<p>ARCHITECT: <b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD</p>	<p>RA 9266, ARTICLE IV SECTION 33 DRAWINGS AND SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS DAILY SIGNED, STAMPED OR SEALED AS INSTRUMENTS OF SERVICE. ARE THE INTELLECTUAL PROPERTY AND DOCUMENTS OF THE ARCHITECT. WHETHER THE OBJECT FOR WHICH THEY ARE MADE IS EXECUTED OR NOT, IT SHALL BE UNLAWFUL FOR ANY PERSON TO DUPLICATE OR TO MAKE COPIES OF SAID DOCUMENTS FOR USE IN THE REPEITION OF AND FOR OTHER PROJECTS OR BUILDINGS, WHETHER EXECUTED PARTLY OR IN WHOLE, WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT OR AUTHOR OF SAID DOCUMENTS.</p>	<p>CONSULTANT: <b>JUAN SIEGFREDO H. VELASQUEZ</b> ENGINEER</p>	<p>PROJECT: <b>PROPOSED PHILIPPINE CHILDREN'S MEDICAL CENTER'S GROUND &amp; SECOND FLOOR REHABILITATION</b></p>	<p>OWNER:  <b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b></p>	<p>SHEET CONTENTS: GENERAL NOTES, LEGENDS ABBREVIATIONS, EQUIPMENT SCHEDULE &amp; DETAILS</p>	<p>REMARKS:</p>	<p>SHEET NUMBER <b>M-01</b></p>
	<p>REG. NO. 5713 PTR. NO. 2186323 T.I.N. NO. 113-604-561 IAPDANO: 01937 166147 072216</p>	<p>VALID UNTIL: 5-15-18 DATE: 01-07-16 PLACE: QUEZON CITY DATE: 07-22-16</p>	<p>REG. 68127 PTR. 735928 T.I.N. 241-300-247</p>	<p>DATE: 04-09-21 DATE: 01-07-19 PLACE: QUEZON CITY</p>	<p>LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.</p>	<p>CONCURRED:  JULIUS A. LECCIONES, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center</p>	<p>ISSUE DATE:</p>	<p>DRAWN BY: CJGE SCALE:</p>



**EQUIPMENT TAG DESIGNATION:**

**TYPE OF AC INDOOR UNIT:**  
 FCU: FAN COIL UNIT  
 FAHU: FRESH AIR HANDLING UNIT  
 PACU: PRECISION TYPE AC UNIT  
 AHU: AIR HANDLING UNIT

**VRF OUTDOOR UNIT CONNECTED FOR VRF INDOOR UNITS**  
 SPLIT TYPE OUTDOOR UNIT CONNECTED FOR SPLIT TYPE INDOOR UNITS

**COOLING CAPACITY (TR)**  
 1: 1 TR ~ 3.517 KW  
 2: 2 TR ~ 7.034 KW  
 3: 3 TR ~ 10.551 KW  
 4: 4 TR ~ 14.068 KW  
 5: 5 TR ~ 17.585 KW  
 7: 7.5 TR ~ 26.37 KW

**TYPE OF INDOOR UNIT**  
 SD: SPLIT TYPE DUCTED TYPE  
 SW: SPLIT TYPE WALL MOUNTED  
 SC: SPLIT TYPE CASSETTE TYPE  
 SF: SPLIT TYPE FLOOR MOUNTED  
 VD: VRF DUCTED TYPE  
 VW: VRF WALL MOUNTED  
 VC: VRF CASSETTE TYPE  
 VF: VRF FLOOR MOUNTED  
 CD: CHILLED WATER DUCTED TYPE  
 CW: CHILLED WATER WALL MOUNTED  
 CC: CHILLED WATER CASSETTE TYPE  
 CF: CHILLED WATER FLOOR MOUNTED

**TYPE OF AC OUTDOOR UNIT:**  
 VRF: VARIABLE REFRIGERANT FLOW UNIT  
 ACCU: AIR-COOLED CONDENSING UNIT  
 WCCU: WATER-COOLED CONDENSING UNIT

**EQUIPMENT DESIGNATION**

**TYPE OF VENTILATION EQUIPMENT:**  
 EF: EXHAUST FAN  
 FAF: FRESH AIR FAN  
 TEF: TOILET EXHAUST FAN  
 KEF: KITCHEN EXHAUST FAN  
 KSF: KITCHEN SUPPLY FAN  
 SPF: STAIRWELL PRESSURIZATION FAN  
 SEF: SMOKE EXTRACTION FAN  
 LPF: LOBBY PRESSURIZATION FAN

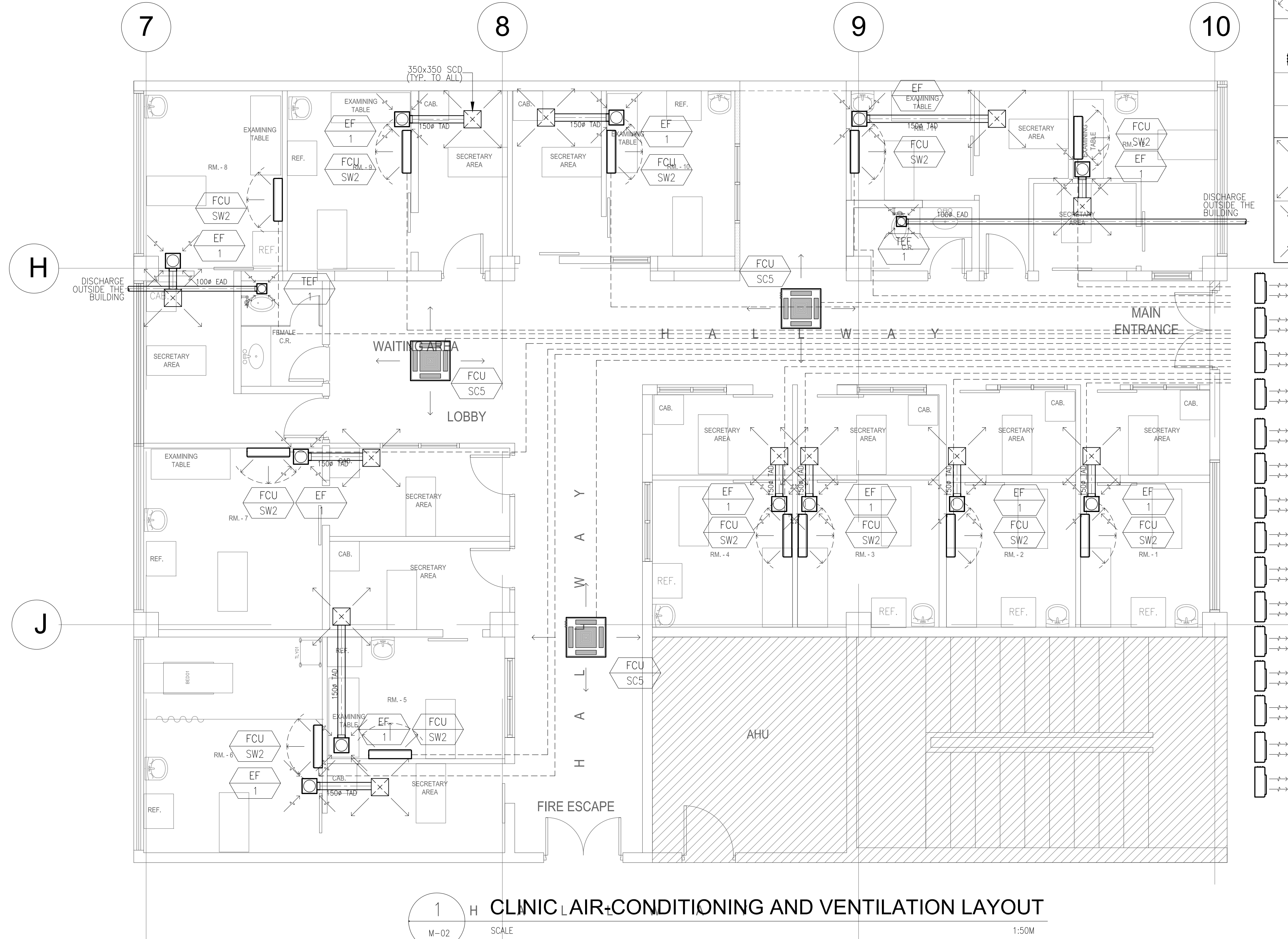
**EQUIPMENT DESIGNATION**

**MECHANICAL INSTALLATION NOTES:**

1. PROVIDE SEISMIC RESTRAINTS FOR ALL RIGIDLY AND RESILIENTLY SUPPORTED EQUIPMENT PER APPLICABLE CODE AND AS SPECIFIED DESIGN AND PROVIDE RESTRAINTS FOR ALL PIPING AND DUCTWORK IN MECHANICAL ROOMS AND FAN ROOMS. RESTRAINTS SHALL BE DESIGNED TO PREVENT PERMANENT DISPLACEMENT IN ANY DIRECTION CAUSED BY LATERAL MOTION.
2. ALL FLOOR SLAB MOUNTED VIBRATING EQUIPMENT SHALL BE PROVIDED WITH VIBRATION ISOLATORS (SPRING TYPE) TO PREVENT VIBRATION AND NOISE TRANSMISSION.
3. ALL FANS SHALL BE PROVIDED WITH SUITABLE FLEXIBLE CONNECTIONS TO THE INTAKE AND DISCHARGE DUCTWORK.
4. VERIFY LOCATION OF CONTROLLERS AND SWITCHES IN THE ELECTRICAL PLANS.
5. PROVIDE GUIDES, HANGERS AND SUPPLEMENTAL SUPPORT STEEL FOR ALL PIPING. PIPE HANGERS AND SUPPORTS SHALL BE SPACED AND CONSTRUCTED IN ACCORDANCE WITH SMACNA AND ASHRAE STANDARDS.
6. PROVIDE TEST HOLES IN DUCTS AND PLENUMS AT FILTERS, COILS AND OTHER EQUIPMENT TO MEASURE STATIC PRESSURES AND AIR FLOW.
7. PROVIDE MANUAL VOLUME DAMPERS IN EACH BRANCH DUCT AND TO EACH AIR OUTLET.
8. INSTALL AIR DUCTS AS CLOSE TO THE BEAMS AS POSSIBLE OTHERWISE INDICATED. PROVIDE CLEARANCE BETWEEN DUCT AND CEILING LINE.
9. DIFFUSER AND GRILLE DIMENSIONS INDICATED REPRESENT NECK SIZE UNLESS OTHERWISE NOTED.
10. ALL SUPPLY DUCTWORK SHALL BE SEALED TO LESS THAN 1% LEAKAGE BY VOLUME AT 127mm W.G. (5 S.P.W.G) USE ELASTOMETRIC RUBBER BASE MASTIC TO FILLER SUITABLE FOR SEALING OVERLAP SEAM. ASPHALT BASE PLASTIC SEALANT IS NOT ACCEPTABLE.
11. SUPPLY AND EXHAUST FANS SHALL BE AMCA-RATED, MANUFACTURER TO SUBMIT BROCHURE AND TECHNICAL DATA SHOWING AMCA-CERTIFIED RATINGS.
12. REFRIGERANT SENSOR MUST BE INSTALLED IN AHU ROOM.
13. PROVIDE PIPE CLADDING (PVC) FOR ALL OUTDOOR REFRIGERANT PIPING OF ACCU'S.
14. PROVIDE ELBOW PIPE SUPPORT ON REFRIGERANT PIPE AND CLADDING.
15. CONTRACTOR SHOULD VERIFY AT SITE IF THERE ARE ANY OBSTRUCTIONS TO REFRIGERANT PIPE RUN AND MAY SUGGEST OR PROPOSE POSSIBLE PIPE RISER LOCATION BASED ON THE PROPOSED LOCATION SHOWN ON THE PLANS AND DRAWINGS.
16. ALL OUTDOOR CLADDING MUST BE PAINTED WITH CORROSION PROTECTION PAINT.
17. ALL DEVIATION FROM PLANS. MUST BE ADVISED TO BUILDING CONSULTANT OTHERWISE CONSULTANT SHALL NOT BE HELD LIABLE FOR ANY CONFLICTS THAT WILL OCCUR.
18. PROVIDE ALL SUPPLY/RETURN/EXHAUST/FRESH AIR DIFFUSERS, GRILLES AND REGISTERS WITH VOLUME DAMPER.

**LEGEND:**

	WALL MOUNTED FAN COIL UNIT
	AIR COOLED CONDENSING UNIT
	REF. PIPING SL/LL
	EQUIPMENT TAG
	350x350 SCD
	CEILING CASSETTE EXHAUST FAN



**1 H CLINIC AIR-CONDITIONING AND VENTILATION LAYOUT**  
 M-02 SCALE 1:50M

 <b>OSCAR R. RUIVIVAR &amp; ASSOCIATES</b> ARCHITECTS ENGINEERS INTERIOR DESIGNERS No.26 Wisdom St. Teresa Village Project 6, Quezon City E-MAIL ADD: orr515.design@gmail.com TEL. 453-92-63/ FAX. 920-16-13	ARCHITECT: <b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD	RA 9266, ARTICLE IV SECTION 33 DRAWINGS AND SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS DULY SIGNED, STAMPED OR SEALED AS INSTRUMENTS OF SERVICE, ARE THE INTELLECTUAL PROPERTY AND DOCUMENTS OF THE ARCHITECT. NEITHER THE OBJECT FOR WHICH THEY ARE MADE IS EXECUTED OR NOT, IT SHALL BE UNLAWFUL FOR ANY PERSON TO DUPLICATE OR TO MAKE COPIES OF SAID DOCUMENTS FOR USE IN THE REPERATION OF AND FOR OTHER PROJECTS OR BUILDINGS, WHETHER EXECUTED PARTLY OR IN WHOLE, WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT OR AUTHOR OF SAID DOCUMENTS.	CONSULTANT: <b>JUAN SIEGFREDO H. VELASQUEZ</b> ENGINEER	PROJECT: <b>PROPOSED PHILIPPINE CHILDREN'S MEDICAL CENTER'S GROUND &amp; SECOND FLOOR REHABILITATION</b>	OWNER:  <b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b>	SHEET CONTENTS: <b>MECHANICAL LAYOUT</b>	REMARKS:	SHEET NUMBER <b>M-02</b>
	REG. NO. 5713 PTR. NO. 2186323 T.I.N. NO. 113-604-561 IAPDANO: 01937 166147 072216	VALID UNTIL: 5-15-18 DATE: 01-07-16 PLACE: QUEZON CITY DATE: 07-22-16	REG. 65127 PTR. 735928 T.I.N. 241-300-247	DATE: 04-09-21 DATE: 01-07-19 PLACE: QUEZON CITY	LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.	CONCURRED: JULIUS A. LECCIONES, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center	ISSUE DATE:	DRAWN BY: CJGE SCALE:

# GENERAL NOTES

- ALL PLUMBING WORKS INCLUDED HEREIN SHALL BE EXECUTED ACCORDING TO THE PROVISIONS OF UNIFORM PLUMBING CODE OF THE PHILIPPINES, THE NATIONAL BUILDING CODE AND THE RULES & REGULATIONS OF GOVERNING CITY.
- COORDINATE THE DRAWING WITH OTHER RELATED DRAWINGS AND SPECIFICATIONS. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY FOUND THEREIN.
- ALL PIPES SHALL BE INSTALLED AS INDICATED ON PLANS. ANY RELOCATIONS REQUIRED FOR PROPER EXECUTION OF OTHER TRADE SHALL BE WITH PRIOR APPROVAL OF THE ARCHITECT OR ENGINEER
- ALL DRAINAGE PIPES SHOWN IN THE DRAWINGS ARE LOCATED BELOW SLAB, VENT PIPES AND COLD WATER SUPPLY PIPING SHOWN ARE LOCATED AT HIGH LEVEL ABOVE CEILING UNLESS OTHERWISE SPECIFIED.
- IT IS NOT INTENDED THAT THE DRAWINGS SHALL SHOW EVERY PIPE, FITTING, VALVE AND APPLIANCE. ALL SUCH ITEMS WHETHER SPECIFICALLY MENTIONED OR NOT, OR INDICATED ON THE DRAWINGS SHALL BE FURNISHED AND INSTALLED. IF NECESSARY, TO COMPLETE THE SYSTEM IN ACCORDANCE WITH THE BEST PRACTICE OF THE PLUMBING TRADE AND TO THE SATISFACTION OF THE EMPLOYER'S REPRESENTATIVE.
- PIPING SHALL BE PROPERLY GRADED OR PITCHED TO ENSURE EASY DRAINAGE. ALL SLOPES FOR HORIZONTAL DRAINAGE SHALL MAINTAIN 1% UNLESS OTHERWISE SPECIFIED.
- EXACT LOCATION OF UTILITIES STUB-OUTS ( WATERLINES, SEWER LINES, MANHOLES AND STORM DRAINAGE LINES ) SHALL BE VERIFIED BY THE CONTRACTOR AT JOBSITE.
- CONTRACTOR TO CONDUCT WATER SAMPLING ANALYSIS PRIOR TO PREPARATION OF SHOP DRAWINGS FOR APPROVAL BY OWNER OR HIS AUTHORIZED REPRESENTATIVE.
- THE PROPOSED UTILITIES SHALL BE MADE TO CONFORM TO THE ACTUAL LOCATION, TAPPING POINT, DEPTH AND INVERT LEVELS OF ALL EXISTING PIPES AND STRUCTURES SHALL BE VERIFIED BY THE CONTRACTOR.
- ALL WORKS SHALL BE DONE WITH UTMOST CARE AND HIGHEST LEVEL OF QUALITY AND SAFETY; WITH NO ADVERSE DISRUPTION TO EXISTING UTILITIES AND / OR OPERATION.
- ALL PIPES PENETRATING THRU WALLS, CEILING, FLOORS SHALL BE ACOUSTICALLY SEALED WITH STC FIRE RATED MATERIALS.
- ALL PIPE SIZES INDICATED IN THE DRAWINGS ARE NOMINAL AND IN REFERENCE TO ITS INTERNAL DIAMETER. IT SHALL NOT BE CONSIDERED AS COMMERCIAL SIZE.
- THE CONTRACTOR SHALL SUBMIT FOR APPROVAL MATERIALS SAMPLE OF PIPES TO BE INSTALLED PRIOR TO INSTALLATION.

# LEGEND & SYMBOLS

## WATER SYSTEM

	CWL	POTABLE/DOMESTIC WATER LINE
	DWR	DOMESTIC WATER RISER
	GV	GATE VALVE
	CV/PCV	CHECK VALVE / PUMP CONTROL VALVE
	HB	HOSE BIBB
	WM	WATER METER

## STORM DRAINAGE SYSTEM

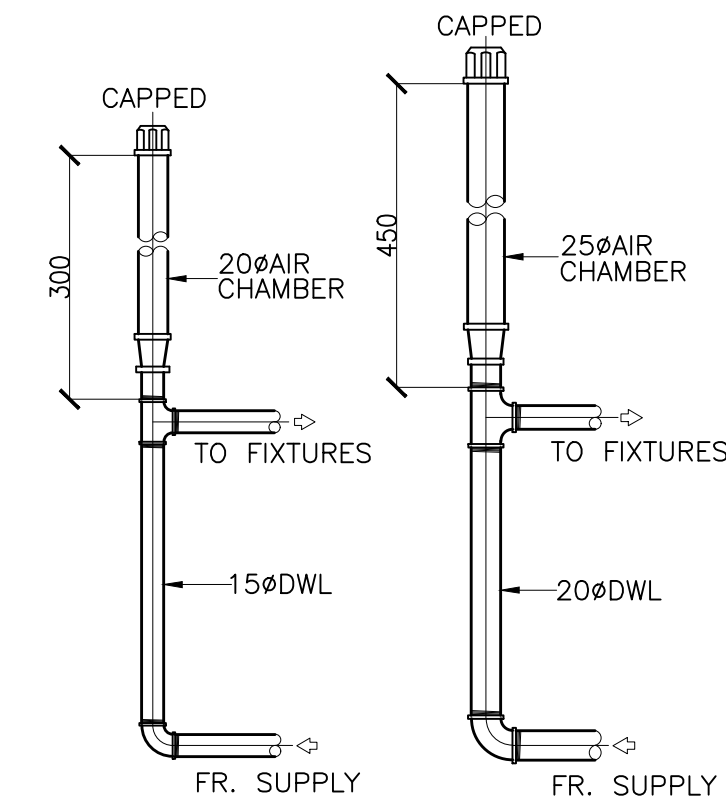
	DS	DOWNSPOUT / WASTE STACK
	DP/UDP	DRAINAGE PIPE/UNDER DRAIN PIPE
	DD/GD/BD	DECK DRAIN / GUTTER DRAIN / BALCONY DRAIN
	CDP/RCDP	CONC. DRAIN PIPE / REIN. CONC. DRAIN PIPE
	GD	GUTTER DRAIN

## WASTE, SEWER & VENT SYSTEM

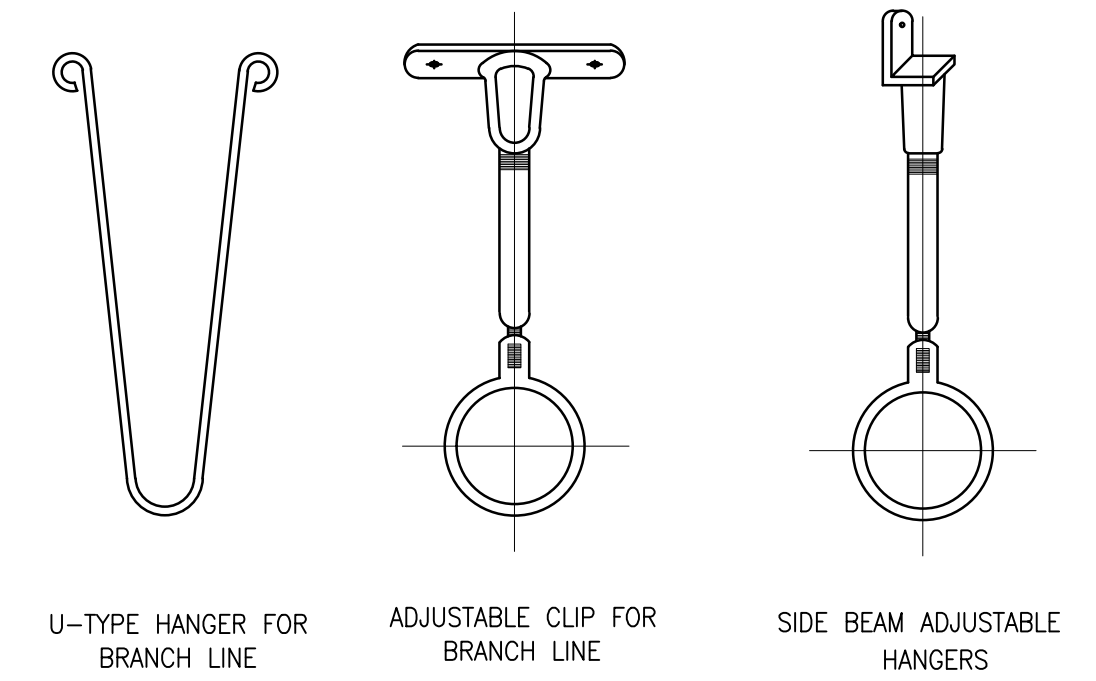
	WP/SP	WASTE PIPE / SEWER PIPE
	SS/WS	SOIL STACK WASTE STACK
	VS	VENT STACK
	VSTE	VENT STACK THRU EYES
	V/VAC/VP	VENT / VENT ABOVE CEILING / VENT PIPE
	FCO/CCO	FLOOR CLEANOUT / CEILING CLEANOUT
	SD/FD	SHOWER DRAIN / FLOOR DRAIN

## PLUMBING FIXTURES

	WC	WATER CLOSET
	LAV	LAVATORY
	WB/PS	WASH BASIN / PANTRY SINK
	UR	URINAL
	GT/OI	GREASE TRAP / OIL INTERCEPTOR
	S	SLOPE



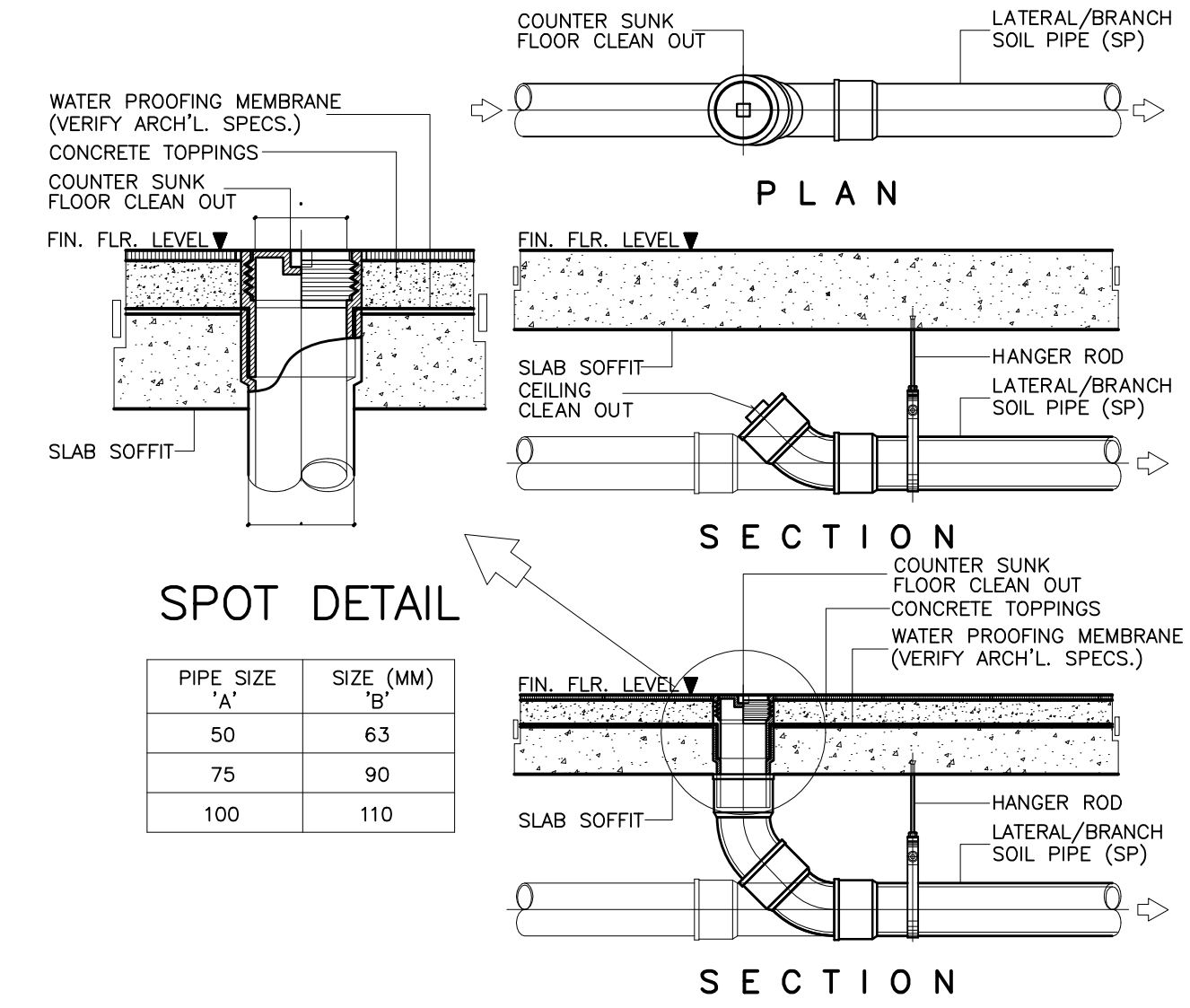
1 AIR CHAMBER DETAIL  
PO 01 SCALE: NTS



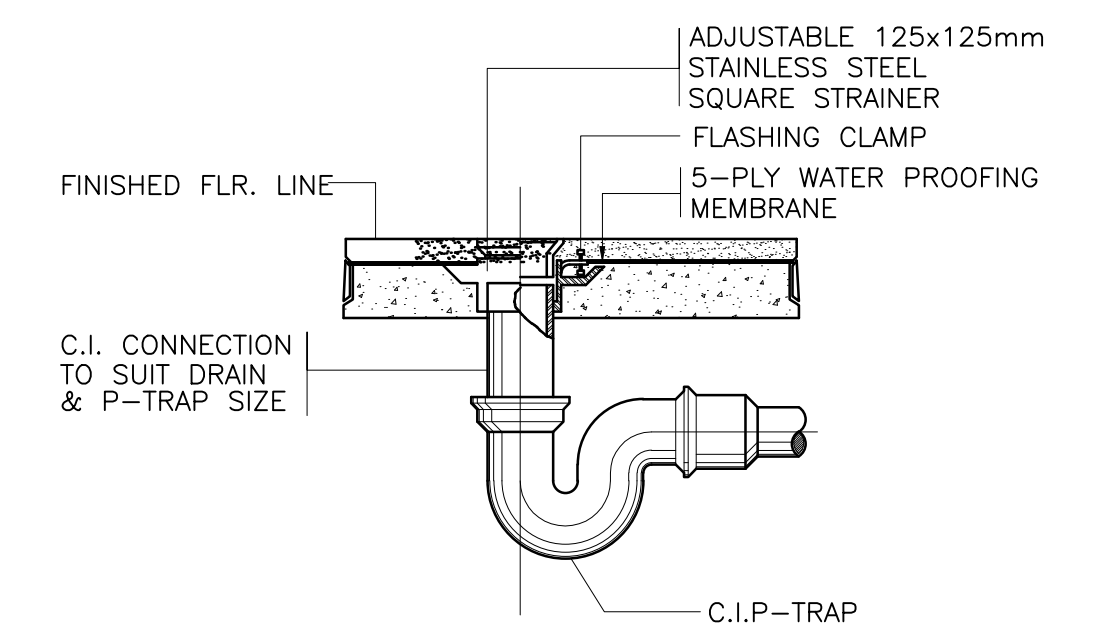
2 ACCEPTABLE PIPE HANGER DETAIL  
PO 01 SCALE: NTS

FIXTURE PIPE SCHEDULE (MINIMUM PIPE SERVICE CONNECTIONS AND TRAP SIZES)				
FIXTURES	WATER SUPPLY PIPE Ø DOMESTIC (MM)	WASTE/SOIL PIPE Ø (MM)	VENT PIPE (MM)	TRAP SIZE (MM)
WATER CLOSET (FLUSH VALVE)	25	100	50	-
WATER CLOSET (FLUSH VALVE)	20	100	50	-
URINALS	20	50	50	50
LAVATORY	15	50	50	38
SERVICE SINK	15	50	50	50
KITCHEN SINK	15	50	50	38
FLOOR DRAIN (SEE NOTE BELOW)	-	50	50	50
SINK DRAIN	-	50	50	83

EQUIVALENT PIPE DIAMETERS			
NOMINAL PIPE DIA(mm)	POLYPROPYLENE (PPR) (mm)	HDPE (mm)	
15	20	20	
20	25	25	
25	32	32	
32	40	40	
40	50	50	
50	65	65	
65	75	75	
80	90	90	
100	110	110	
125	160	160	
150	N/A	225	



3 DETAIL OF CLEANOUT  
PO 01 SCALE: NTS

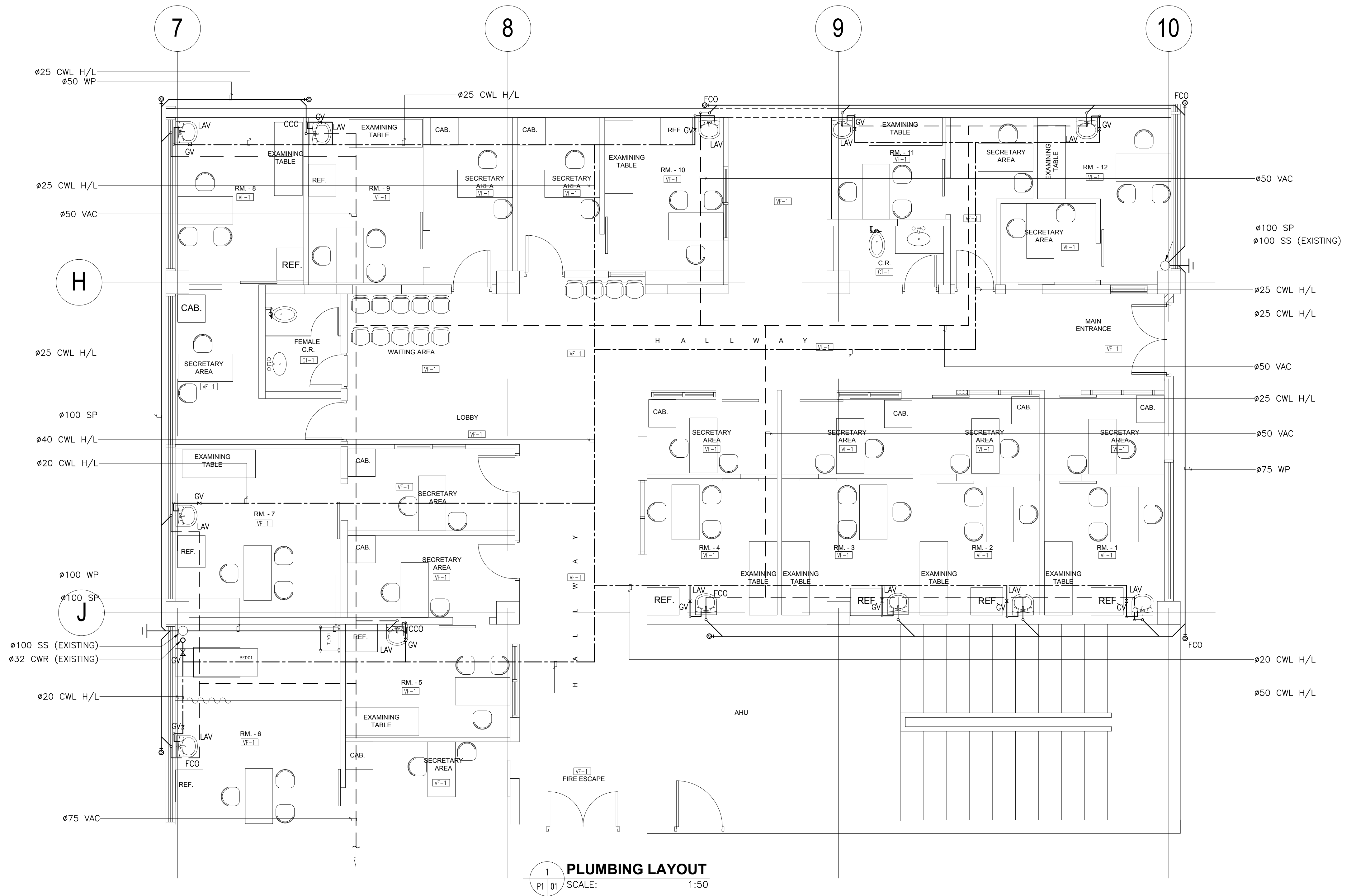


4 FLOOR DRAIN DETAIL  
PO 01 SCALE: NTS

NOTES:  
1.TYPICAL AT 50MM DIAMETER UNLESS OTHERWISE INDICATED IN THE PLAN. WASTE PIPE AND TRAP SIZE SHALL CONFORM TO SIZE OF FLOOR DRAIN.

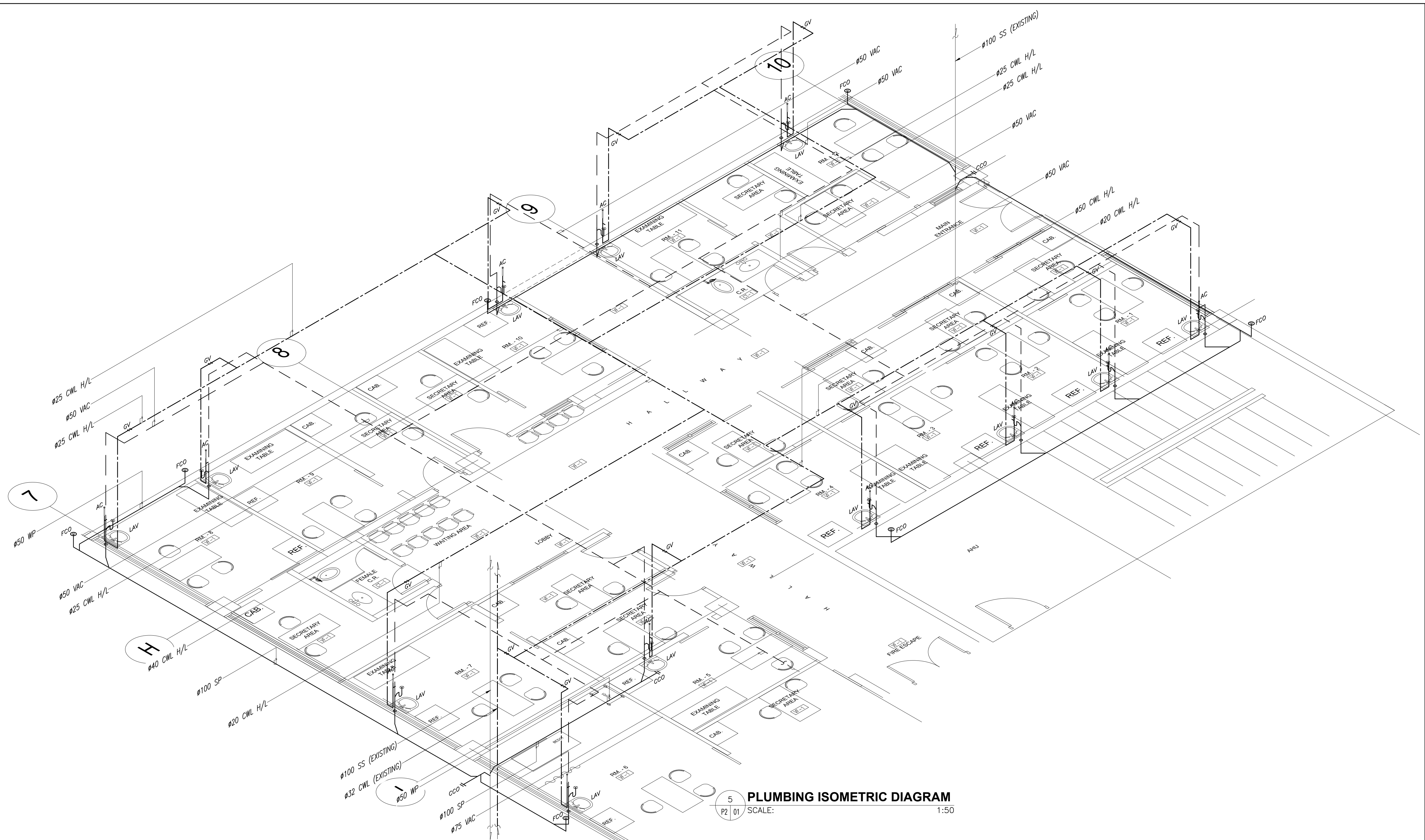
<p><b>OSCAR R. RUIVIVAR &amp; ASSOCIATES</b> ARCHITECTS ENGINEERS INTERIOR DESIGNERS</p> <p>No.26 Wisdom St. Teresa Village Project 6,Quezon City E-MAIL ADD: orr215.design@gmail.com TEL. 453-92-63/ FAX. 920-16-13</p>	ARCHITECT:  <b>OSCAR R. RUIVIVAR</b> ARCHITECT-OF-RECORD	RA 9266, Article IV section 33 Drawings and Specifications and other Contract Documents duly signed, stamped or sealed, as instruments of Service, are the Intellectual Property and Documents of the Architect, whether the object for which they are made is executed or not. It shall be unlawful for any person to duplicate or to make copies of said Documents for use in the repetition of and for other projects or buildings, whether executed partly or in whole, without the written consent of the Architect or Author of said Documents.	CONSULTANT:  <b>LEOVIMEL J. VINELES</b> SANITARY ENGINEER	PROJECT:  <b>RENOVATION OF GROUND FLOOR AND SECOND FLOOR OF PCMC'S MAIN BUILDING (DOCTOR'S CLINIC EXTENSION)</b>	OWNER:  <b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b>  CONCURRED:  JULIUS A. LECCIONES, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center	SHEET CONTENTS:  AS SHOWN	REVISIONS: <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>																					DATE:  ISSUE DATE:	SHEET NUMBER:  <b>P0-01</b>  DRAWN BY: SCALE:
REG. NO. 5713      VALID UNTIL: 5-15-21 PTR. NO. 7324412      DATE: 01-04-19 T.I.N. NO. 113-604-561      PLACE: QUEZON CITY IAPGANO: 01937 250805 021119      DATE: 06-30-19	REG. 2435      DATE: 08-13-20 PTR. 1247583      DATE: 01-08-19 T.I.N. 237-652-602      PLACE: SAN JUAN CITY	LOCATION: AGHAM ROAD, COR. QUEZON AVE., DILIMAN, Q.C.	JULIUS A. LECCIONES, CESO III EXECUTIVE DIRECTOR Philippine Children's Medical Center	AS SHOWN	REVISIONS:	DATE:	SHEET NUMBER:																						





1 PLUMBING LAYOUT  
 P1 01 SCALE: 1:50

<p><b>OSCAR R. RUIVIVAR &amp; ASSOCIATES</b>          ARCHITECTS ENGINEERS INTERIOR DESIGNERS</p> <p>No.26 Wisdom St. Teresa Village Project 6, Quezon City          E-MAIL ADD: orr215.design@gmail.com          TEL. 453-92-63/ FAX. 920-16-13</p>	ARCHITECT: <p><b>OSCAR R. RUIVIVAR</b>          ARCHITECT-GF-RECORD</p>	RA 9266, Article IV section 33 Drawings and Specifications and other Contract Documents duly signed, stamped or sealed, as instruments of Service, are the Intellectual Property and Documents of the Architect, whether the object for which they are made is executed or not. It shall be unlawful for any person to duplicate or to make copies of said Documents for use in the repetition of and for other projects or buildings, whether executed partly or in whole, without the written consent of the Architect or Author of said Documents.	CONSULTANT: <p><b>LEOVIMEL J. VINELES</b>          SANITARY ENGINEER</p>	PROJECT: <p><b>RENOVATION OF GROUND FLOOR AND SECOND FLOOR OF PCMC'S MAIN BUILDING (DOCTOR'S CLINIC EXTENSION)</b></p>	OWNER: <p><b>PHILIPPINE CHILDREN'S MEDICAL CENTER</b></p>	SHEET CONTENTS: <p>PLUMBING LAYOUT</p>	REVISIONS: <table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>																					DATE: 	SHEET NUMBER <p><b>P1-01</b></p>
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5 PLUMBING ISOMETRIC DIAGRAM  
SCALE: 1:50

**OSCAR R. RUIVIVAR & ASSOCIATES**  
ARCHITECTS ENGINEERS INTERIOR DESIGNERS  
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ARCHITECT:  
**OSCAR R. RUIVIVAR**  
ARCHITECT-OF-RECORD

REG. NO. 5713 VALID UNTIL: 5-15-21  
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said Documents.

CONSULTANT:  
**LEOVIMEL J. VINELES**  
SANITARY ENGINEER

REG. 2435 DATE: 08-13-20  
PTR. 1247583 DATE: 01-08-19  
T.I.N. 237-652-602 PLACE: SAN JUAN CITY

PROJECT:  
**RENOVATION OF GROUND FLOOR AND  
SECOND FLOOR OF PCMC'S MAIN BUILDING  
(DOCTOR'S CLINIC EXTENSION)**

LOCATION: AGHAM ROAD, COR. QUEZON AV., DILIMAN, Q.C.

OWNER:  
**PHILIPPINE CHILDREN'S  
MEDICAL CENTER**

CONCURRED:  
JULIUS A. LECCIONES, CESO III  
EXECUTIVE DIRECTOR  
Philippine Children's Medical Center

SHEET CONTENTS:  
**PLUMBING ISOMETRIC DIAGRAM**

REVISIONS:	DATE:	SHEET NUMBER
		<b>P2-01</b>
ISSUE DATE:		DRAWN BY: SCALE: