



## **Dufferin-Peel Catholic District School Board**

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**STANDARD TEXT GUIDELINE FOR**

# **Plumbing and Drainage**

for

**ELEMENTARY AND SECONDARY SCHOOLS**

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**Prepared by the Plant Department**

**Formatted by the Design Department**



**Elementary and Secondary Schools**

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<b>1</b>	<b>PREAMBLE</b> .....	<b>1</b>
1.1	GENERAL.....	1
1.2	RESPONSIBILITY.....	1
1.3	REVISIONS TO THE GUIDELINE.....	1
1.4	DEVIATIONS TO GUIDELINE.....	1
1.5	TERMS.....	1
1.6	CONTRACT CONTROL.....	1
<b>2</b>	<b>CODES AND STANDARDS</b> .....	<b>2</b>
<b>3</b>	<b>DESIGN INTENT</b> .....	<b>3</b>
3.1	GENERAL.....	3
<b>4</b>	<b>SERVICE CONNECTIONS</b> .....	<b>3</b>
4.1	GENERAL.....	3
<b>5</b>	<b>STORM DRAINAGE SYSTEM</b> .....	<b>4</b>
<b>6</b>	<b>SANITARY DRAINAGE SYSTEM</b> .....	<b>4</b>
<b>7</b>	<b>INCOMING DOMESTIC COLD WATER SERVICE</b> .....	<b>5</b>
<b>8</b>	<b>PIPING AND VALVES</b> .....	<b>5</b>
8.1	HOT WATER AND COLD WATER SYSTEMS.....	5
8.2	VENT PIPING.....	5
8.3	NON- FREEZE WALL HYDRANTS.....	6
<b>9</b>	<b>IRRIGATION SYSTEM</b> .....	<b>6</b>
<b>10</b>	<b>DOMESTIC HOT WATER SYSTEM</b> .....	<b>6</b>
10.1	STORAGE TYPE SYSTEM.....	6
10.2	TANKLESS HOT WATER SYSTEM.....	7
10.3	VENTING AND COMBUSTION.....	7
<b>11</b>	<b>INSULATION</b> .....	<b>7</b>
<b>12</b>	<b>PLUMBING SPECIALITIES</b> .....	<b>8</b>
12.1	FLOOR DRAINS.....	8
12.2	WATER HAMMER ARRESTORS.....	8
<b>13</b>	<b>PLUMBING FIXTURES – ELEMENTARY SCHOOLS</b> .....	<b>8</b>
13.2	BARRIER FREE PLUMBING FIXTURES.....	8
13.3	SINKS AND BASINS.....	9

**TABLE OF CONTENTS**

**PLUMBING AND  
DRAINAGE**

**Elementary and Secondary Schools**

---

13.4 EYE WASH STATIONS..... 10

13.5 SHOWERS..... 10

13.6 WATER CLOSETS..... 10

13.7 URINALS..... 11

13.8 DRINKING FOUNTAINS..... 11

13.9 MOUNTING HEIGHTS OF FIXTURES..... 11

14 PLUMBING FIXTURES – SECONDARY SCHOOLS..... 11

**Elementary and Secondary Schools**

---

**1 PREAMBLE**

**1.1 GENERAL**

- 1.1.1 This Guideline outlines the Board's minimum standards, specific and general requirement for the design of HVAC systems in new and renovated facilities.
- 1.1.2 These requirements are not intended to be all an encompassing specification, but to act as a guide to the Design Consultant.

**1.2 RESPONSIBILITY**

- 1.2.1 Responsibility for the design and performance of the facility systems remains with the Consultant and under no circumstances shall the Consultant be relieved of liability for the design due to this design guide. If the Consultant/Architect is unclear on the requirement of an item covered in this guide, then clarification shall be obtained in writing from the Board.

**1.3 REVISIONS TO THE GUIDELINE**

- 1.3.1 This Guideline will be under constant revision and before commencing a new project, the Architect/Engineer/Consultant shall obtain the latest version of the Guideline. All revisions to this Guideline will be numbered and dated.

**1.4 DEVIATIONS TO GUIDELINE**

- 1.4.1 The Consultant shall generally follow these requirements. If the Consultant wishes to deviate in any form whatsoever, the Board **MUST** be consulted prior to making such deviations.

**1.5 TERMS**

- 1.5.1 The term "Board" in this Guideline refers to "Dufferin-Peel Catholic District School Board".
- 1.5.2 The term "Consultant" in this Guideline refers to the Mechanical Consulting Engineer appointed for the project.
- 1.5.3 The term "Engineer" in this Guideline refers to any engineering discipline person employed in the design, consulting, or other engineering aspects in the development of the design work.

**1.6 CONTRACT CONTROL**

- 1.6.1 This Design Guideline covers work under Division 15, Plumbing and Drainage.

**2 CODES AND STANDARDS**

2.1.1 Design, specifications and installation shall comply with latest editions and all amendments of the following Authorities and Approval Agencies. Where conflicts occur, higher standards shall apply.

Ontario Building Code (OBC)

Code and Guide to Part 7 (Plumbing) of the Ontario Building Code.

Natural Gas and Propane Installation Code, B149.1-00

American National Standards Institute (ANSI)

Air Moving and Conditioning Association (AMCA)

American National Standards Institute (ANSI)

Air Conditioning and Refrigeration Institute (ARI)

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

American Society of Mechanical Engineers (ASME)

American Society of Testing and Materials (ASTM)

American Water Works Association (AWWA)

Building Officials Code Administrators (BOCA)

Canadian Electrical Manufacturer's Association (CEMA)

Canadian Gas Association (CGA)

Canadian Standards Association (CSA)

Factory Mutual (FM)

Insurer's Advisory Organization (IAO)

National Building Code (NBC)

National Board of Fire Underwriters (NBFU) – Currently American Insurance Association

National Fire Protection Association (NFPA)

Sheet Metal and A/C Contractors' National Association (SMACNA)

Underwriters' Laboratories of Canada (ULC)

Ontario Electrical Code (OEC)

Ontario Occupational Health and Safety Act (OHSA)

Ministry of Environment (MOE)

Ministry of Labour (MOL)

**Elementary and Secondary Schools**

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**3 DESIGN INTENT**

**3.1 GENERAL**

- 3.1.1 In consultation with the Project Architect, the Consultant shall present to the Board, both verbally and in writing, a detailed outline of the proposed Plumbing Systems.
- 3.1.2 If there is inadequate information provided in the design brief process, the Board reserves the right to submit a detailed Questionnaire that shall be completed by the Consultant before the actual system design process is started.
- 3.1.3 A life cycle cost analysis shall be undertaken and presented, taking into consideration, initial capital, operating and maintenance costs for all systems being considered for a project.

**4 SERVICE CONNECTIONS**

**4.1 GENERAL**

- 4.1.1 Consultant shall ensure that adequate services are available at Project site for the following:
  - 4.1.1.1 Storm Sewer
  - 4.1.1.2 Sanitary Sewer
  - 4.1.1.3 Fire Protection and Domestic Water Service
  - 4.1.1.4 Consultant shall arrange for a water-flow test to be carried out at site to confirm adequacy of water flow and pressure required for sprinkler system. Cost of this service shall be paid for directly by the Board.
  - 4.1.1.5 Consultant shall advise the Board, through the Architect, the cost of the following services and service connection that form part of the cash allowances on the Project:
    - 4.1.1.6 Storm sewer connections to street mains
    - 4.1.1.7 Sanitary sewer connections to street mains
    - 4.1.1.8 Water connections from street mains for fire protection and domestic water services
    - 4.1.1.9 Gas connections from street mains to gas meter/regulator assembly in the Building exterior wall
    - 4.1.1.10 Any other Inspection Service required for the Project, but not included in the Tender Documents.

**5 STORM DRAINAGE SYSTEM**

- 5.1.1 Design a complete storm drainage system for the building and connect to street mains.
- 5.1.2 Where necessary, use control-flow roof drains, in consultation with Site Services Consultant.
- 5.1.3 Consultant shall check for storm water management requirements with the Architect/Board. Co-ordinate with Site Service Consultant.
- 5.1.4 Roof hoppers shall be provided with cast iron or aluminum dome strainers. Plastic domes shall not to be used.
- 5.1.5 Roof hoppers shall be provided with under deck clamps and 610mm (24") square bearing pans.
- 5.1.6 Insulate all unburied horizontal and vertical storm drain lines, up to connection to buried mains.
- 5.1.7 Cleanouts shall be flush with surrounding surface.
- 5.1.8 When making connections to existing buried mains, Consultant shall obtain existing inverts from existing drawings and verify the conditions of existing services.

**6 SANITARY DRAINAGE SYSTEM**

- 6.1.1 Consultant shall design a complete sanitary drainage system for the Building and connect to street.
- 6.1.2 All sanitary drainage systems shall discharge by gravity flow. Pumped sanitary drainage systems shall only be used where necessary.
- 6.1.3 Drawings shall clearly show the locations of all clean-outs.
- 6.1.4 Cast-iron or copper sanitary piping shall be used for above ground application. ABS or PVC piping shall be used for buried sanitary system. Where buried plastic lines are used, the conversion to cast-iron shall be made a minimum of three feet before rising above finished floor.
- 6.1.5 Sanitary, storm or any mechanical services shall not run through an exit stairwell, transformer room(s), or elevator machine room.
- 6.1.6 All sanitary and storm mains shall run along corridors, wherever possible, to permit easy access.
- 6.1.7 Cleanouts shall be flush with surrounding surface.
- 6.1.8 When making a connection to existing sanitary mains in existing building, verify all inverts prior to finalizing design. Obtain existing as built drawings from the Board.
- 6.1.9 See Architects' specifications for provisions for future additions.

**7 INCOMING DOMESTIC COLD WATER SERVICE**

- 7.1.1 Consultant shall design a complete domestic cold water system and connect to street mains.
- 7.1.2 Buried pipe shall be ductile iron, cement lined or class 150 PVC with cast iron OD to AWWA as approved by Local Utilities. Joints shall be rubber gaskets for mechanical joints or flanges to ANSI/AWWA standards.
- 7.1.3 Piping shall lay on compacted washed sand in accordance with AWWA class 'B' bedding, at least 1800mm (6'-0") below finished grade. Co-ordinate with site services plan. Consultant shall review soil condition prior to designing the buried piping system.
- 7.1.4 Consultant shall arrange to have Mechanical Contractor disinfect the system in accordance with requirements of Regional Authority. After testing the quality of water, provide water quality test report. Mechanical Contractor shall include the cost for chlorination of the domestic water system in his tender sum and for obtaining a test report.
- 7.1.5 Consultant shall arrange to have Mechanical Contractor include, in the tender sum, cost of water meter supplied by the Region or other local utility and all associated costs with regard to water meter installation charged by the Region or Local Utility.
- 7.1.6 Consultant shall include for backflow preventor and pressure reducing valve assembly to maintain a maximum water pressure of 620 kPa (90psig). Install pressure gauge complete with isolation valve downstream of the water meter and a drain valve downstream of the meter for water sampling purposes.

**8 PIPING AND VALVES**

**8.1 HOT WATER AND COLD WATER SYSTEMS**

- 8.1.1.1 All piping shall be Type 'L' copper. Joints shall be capillary type using lead-free solder and appropriate flux. Type 'K' copper shall be used for all buried lines. Joints over 50mm (2") shall be sif-bronze welded with cupro nickel "weldable" fittings.
- 8.1.1.2 Valves shall be rated for a minimum 860kPa (125psig) W.O.G. pressure classification, of the rising-stem design with asbestos free packing.
- 8.1.1.3 Valves shall be easily serviceable. Use globe, gate, ball and check valves with total bronze parts.

**8.2 VENT PIPING**

- 8.2.1.1 Use Copper DWV pipe. Joints shall be capillary type using lead-free solder and appropriate flux.

**8.3 NON-FREEZE WALL HYDRANTS**

- 8.3.1 Install wall hydrants on each face of the building exterior for landscaping use.
- 8.3.2 All wall hydrants shall be 19mm (¾") diameter with vacuum breaker, non-freeze type contained in lockable, fully recessed, valve boxes provided with keys.

**9 IRRIGATION SYSTEM**

- 9.1.1 The incoming domestic water line shall be sized to provide a separate 50mm (2") pipe with shut-off valve and backflow preventor and terminated 500 mm beyond the hard landscape as indicated by the Certified Irrigation Designer. See "Irrigation Systems" Guideline

**10 DOMESTIC HOT WATER SYSTEM****10.1 STORAGE TYPE SYSTEM**

- 10.1.1 Consultant shall carry out life cycle cost analysis to determine whether domestic hot water system shall have storage capacity or shall be served by tankless hot water heaters
- 10.1.2 All piping shall be Type 'L' copper. Joints shall be capillary type using lead-free solder and appropriate flux. Joints over 50mm (2") shall be sif-bronze welded with cupro nickel weldable fittings.
- 10.1.3 Valves shall be rated for a minimum 860kPa (125psig) W.O.G. pressure classification, of the rising-stem design with asbestos free packing.
- 10.1.4 Valves shall be easily serviceable. Use globe, gate, ball and check valves with total bronze parts.
- 10.1.5 Use tankless hot water heaters for domestic service where possible.
- 10.1.6 Hot water heater with storage capacity greater than 90 gallons shall be P.V.I. MAXIM water heaters with direct combustion air vent.
- 10.1.7 Domestic hot water piping layout shall have a re-circulation loop complete with bronze fitted pump when any hot water fixture is installed further than 5m (15') from supply pipe. Install circuit balancing valve in the return pipe.
- 10.1.8 Consultant shall design tempered hot water supply, temperature not to exceed 40.5°C (105°F), to serve Kindergarten Areas or other designated areas, utilizing 3 way valve.
- 10.1.9 Consultant shall design hot water supply temperature not to exceed 60°C (140°F) to serve all other areas. Any higher temperature hot water required for custodial cleaning or maintaining hygienic conditions in specific areas shall be via local booster heaters.

**Elementary and Secondary Schools**

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**10.2 TANKLESS HOT WATER SYSTEM**

- 10.2.1 Consultant shall design tankless hot water system sized to satisfy maximum simultaneous demand.
- 10.2.2 Tankless system shall consist of multiple heaters.
- 10.2.3 Each heater shall be fully modulating gas fired tankless heater with power vented hood
- 10.2.4 Use tankless heater manufactures control sequences for maximum optimum performance
- 10.2.5 Each heater shall be a copper coil integral fin and tube construction with quick release brass or bronze waterways.
- 10.2.6 Each heater shall be factory assembled and tested
- 10.2.7 Each heater shall be provided with the following safety features:
  - 10.2.7.1 Built in freeze protection
  - 10.2.7.2 Manual reset hi-limit
  - 10.2.7.3 Overheat cut-off fuse
  - 10.2.7.4 Inlet/Outlet Thermistors for constant temperature monitoring.
  - 10.2.7.5 Flue back-draft pressure switch
  - 10.2.7.6 Flame sensor
  - 10.2.7.7 GFI power supply

**10.3 VENTING AND COMBUSTION**

- 10.3.1 Category III stainless steel sealed air tight with seams and joints sealed with high heat resistant silicone sealant, minimum temperature rating 350°F.
- 10.3.2 Combustion air supply shall comply with latest edition of ANSI Standard Z223.1 or local applicable code.
- 10.3.3 Venting system shall comply with section 7 of the CAN/CSA B149.1 Natural Gas and Propane Installation Code.

**11 INSULATION**

- 11.1.1 Material shall have maximum flame spread rating of 25 and maximum smoke developed rating of 50.
- 11.1.2 Piping and fittings shall be insulated with glass fibre insulation complete with factory applied All Service Jacket (ASJ).
- 11.1.3 Material thickness shall comply with those prescribed in ASHRAE 90.1 Standard (Latest Revision).

**12 PLUMBING SPECIALITIES****12.1 FLOOR DRAINS**

- 12.1.1 Install floor drains in all Custodian Rooms, Student Washrooms, Staff Washrooms and Orthopedic Washrooms and other designated areas.
- 12.1.2 In secondary schools floor drains shall be installed in kitchen, greenhouses and some workshops.
- 12.1.3 Install hub drains in servery, kitchen, and heat pump closets.
- 12.1.4 Install a minimum of 2 floor drains in Mechanical Rooms.
- 12.1.5 Terminate equipment drain over a funnel floor drain. Size of funnel shall be minimum 100mm x 225mm (4" x 9"), oval shape.
- 12.1.6 Install trap seal primer at all floor drains as required by code.

**12.2 WATER HAMMER ARRESTORS**

- 12.2.1 Install mechanical water hammer arrestors at the end of each branch serving a group of plumbing fixtures or elsewhere as required to prevent water hammer.
- 12.2.2 All water hammer arrestors shall be accessible and shall be provided with isolation valves.

**13 PLUMBING FIXTURES – ELEMENTARY SCHOOLS**

- 13.1.1 Architectural drawings shall govern the quantity and location of fixtures. Review Elementary School Guidelines –Design Criteria and fitments for number of sinks in each area.
- 13.1.2 Consultant shall co-ordinate mounting heights with architectural layouts except as noted elsewhere.
- 13.1.3 Install access doors/covers for servicing concealed valves and fittings.
- 13.1.4 All fixtures shall be of the water saver type.
- 13.1.5 The flushing system for urinals shall be as supplied by Water Matrix, Telephone (905) 850-8080 ext. 230.
- 13.1.6 Consultant shall submit a complete set of fixture catalogue cuts to the Board for their review and approval prior to tendering the Project.

**13.2 BARRIER FREE PLUMBING FIXTURES**

- 13.2.1 Certain areas such as PIP Room, PIP Barrier Free washroom and, "Barrier Free Washroom with Shower" when attached to the Health Room have special requirements regarding heights and depths of sinks etc. The

**Elementary and Secondary Schools**

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Consultants must read and follow the special requirements for these areas as described in the *Elementary and Secondary Guidelines - Design Criteria and Fitments*.

- 13.2.2 Specifically identified heights and types of fixtures in the Elementary and Secondary School – Design Guidelines and Fitments supersede the descriptions below.

**13.3 SINKS AND BASINS**

- 13.3.1 **Staff Room:** Stainless steel double bowl, 878mm x 521mm x 305mm (31" x 20 ½" x 10") deep, counter mounted, 203mm (8") deck mounted faucet, swing spout. Provide dishwasher connection to P-trap and hot water connection using SS flex hose and shut-off valve. Provide cold and hot water supplies to sink.
- 13.3.2 **Standard Classrooms, Workrooms and Custodians Office:** 18-8, type 302, Stainless steel bowl, 508mm x 521mm x 203mm (20" x 20 ½" x 8"), deep single compartment, P-trap with C.O., cast metal handle, deck mounted mixing faucet with goose neck spout, hot and cold water supplies.
- 13.3.3 **Special Ed. Classrooms and Health Room:** 18-8, type 302, stainless steel bowl, 508mm x 521mm x 203mm (20" x 20 ½" x 8"), deep single compartment, P-trap with C.O., cast metal (4") blade handles, hot and cold water supplies.
- 13.3.4 **Art Room** (If required by program requirements): Single compartment, 18-8 type 302 stainless steel 521mm x 508mm x 250mm (20 ½" 20" x 10") deep bowl, P-trap with C.O., cast brass metal handle, hot and cold water. Provide sediment interceptor adjacent or below sink. Allow 305mm (12") clearance for basket removal.
- 13.3.5 **Science Room, Science Prep. Room:** single compartment 18-8 type 316 stainless steel 432mm x 483mm x 203mm (17" x 19" x 8") deep sink, deck mounted, gooseneck spout, cast brass metal handle, P-trap with clean out. **Hot and cold water service to these sinks.**
- 13.3.6 **Kindergartens:** 18-8, type 302, stainless steel bowl, 508mm x 521mm x 203mm (20" x 20 ½" x 8"), deep single compartment, P-trap with C.O., cast metal handle, deck mounted mixing faucet with goose neck spout, hot water with thermostatic mixing valve below sink, set to 90°F and cold water supplies.
- 13.3.7 **Student Washrooms:** Wash fountain: pre-cast terrazzo, 4 users individual control, sensor operated, hot and cold water with thermostatic mixing valve, fixed spray nozzles. Do not specify built-in soap dispensers.
- 13.3.8 **Staff Washrooms Lavatories:** Counter mounted, vanity type, 102mm (4") centers, 521mm x 445mm (20 ½" x 17 ½") oval, vitreous china cast metal lever handles, P-trap with C.O., cold and hot water supplies.
- 13.3.9 **Handicap Lavatories** (For barrier free, unisex washrooms accessible from corridor): wall hung, for wheelchair use: vitreous china, 102mm (4")centers,

532mm x 532mm (21" x 21"), 100mm (4") blade handles, P-trap with C.O., Wall carrier, cold and hot water supplies. Wrap exposed pipes and fitting with approved covering. Provide semi-china pedestal to cover exposed piping.

- 13.3.10 **Kindergarten Lavatories:** wall hung: vitreous china, 102mm (4") centers, 508mm x 457mm (20" x 18"), cast metal lever handles, hot water with thermostatic mixing valve below sink, set to 90°F and cold water supplies. Multiple sinks can be served from single mixing valve with maximum dead leg from valve of 10 feet. Include wall carrier brackets.

13.3.10.1 Heights of kindergarten lavatories are to be of a lower height than standard. (Refer to Design Guidelines.)

- 13.3.11 **Mop sink basins, custodian rooms:** Pre-cast terrazzo, 914mm x 610mm x 305mm (36" x 24" x 12") deep, floor-mounted, 203mm (8") centers, wall mounted faucet, 75mm (3") P-trap. Provide hose-end vacuum breaker, 787mm (31") vinyl hose and hanger.

#### 13.4 EYE WASH STATIONS

- 13.4.1 Differing application require different types of eye wash stations. Refer to the Elementary and Secondary School Guidelines – Design Criteria and Fitments for types, locations and heights of the eye wash stations.

#### 13.5 SHOWERS

- 13.5.1 **Showers, Secondary Schools - Students and Staff:** pressure balancing single lever mixing control valve, concealed discharge and water saver shower nozzle.
- 13.5.2 **Showers, wheelchair use:** pressure balancing mixing control valve, single control adjustable hand shower spray, 762mm (30") offset slide bar, 1500mm (59") metal flexible hose, vacuum breaker. (Refer to Elementary and Secondary Guidelines – Design Criteria and Fitments, including Illustrative Sketches for heights and required accessories with Barrier Free showers.)

#### 13.6 WATER CLOSETS

- 13.6.1 **Student washrooms:** floor mounted, vitreous china, elongated bowl, Teck 2 flush valve heavy-duty **black** solid plastic seat, open front-less cover.
- 13.6.2 **Barrier Free washrooms, wheelchair use:** similar to above, 406mm (16") high, extended seat bumper on flush valve, heavy-duty **black** solid plastic seat, open front with cover. (Refer to Design Guidelines for water closet types in PIP Rooms.)
- 13.6.3 Staff room and Kindergarten: floor mounted, vitreous china, elongated bowl, pressure assist tank, heavy duty, **black** solid plastic seat, open front with cover. (Kindergarten water closets are to be standard height.)

**Elementary and Secondary Schools**

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**13.7 URINALS**

- 13.7.1 **Student's washrooms:** Wall hung, vitreous china with wall carrier. Urinal tanks shall be installed with 'Water Matrix' flushing system, or Water Matrix valveless flushing system.
- 13.7.2 **Staff Washrooms:** Wall hung, vitreous china with wall carrier and manual flush valve.

**13.8 DRINKING FOUNTAINS**

- 13.8.1 3.10.7.1 General and wheelchair use: dual fountains, hi-lo, wall hung, stainless steel 18 gauge with #4 satin finish, 457mm (18") round receptors, mounting plate and wall supports. (Refer to Illustrative Sketches for Elementary School heights.)

**13.9 MOUNTING HEIGHTS OF FIXTURES**

- 13.9.1 Refer to Elementary and Secondary School Guidelines for special heights of fixtures. If no special height of fixtures is mentioned in the Guideline, assume standard heights.

**14 PLUMBING FIXTURES – SECONDARY SCHOOLS**

- 14.1.1 While the types of fixtures in the general areas are essentially the same for Secondary Schools, the Consultants must refer to the Secondary School Guidelines – Design Criteria and Fitments for specialized fixtures in teaching areas.

END OF PLUMBING AND DRAINAGE GUIDELINE

**LATEST REVISIONS ARE IN GREEN FONT**

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