# TABLE OF CONTENTS

## 1.0 INTRODUCTION ................................................................. 12

1.1 General ........................................................................... 12
1.2 Units .............................................................................. 12
1.3 Terminology ..................................................................... 12
1.4 Confidentiality Statement .................................................. 13
1.5 Form & Content .............................................................. 13
1.6 Maintenance of the Manual ............................................... 14
1.7 Exemptions from the Requirements of the Manual .......... 14
1.8 Definitions ....................................................................... 14

## 2.0 PROCESS ........................................................................ 16

2.1 General ........................................................................... 16
  2.1.1 Preamble ...................................................................... 16
  2.1.2 Documents .................................................................... 16
  2.1.3 Owner / Client .............................................................. 16
  2.1.4 Project Governance ...................................................... 16
  2.1.5 Consultant Selection ...................................................... 16
  2.1.6 Professional Services ...................................................... 17
  2.1.7 Project Scope ............................................................... 17
  2.1.8 Building Envelope Specialist ........................................ 19
  2.1.9 Drafting Standards & Units of Measure ....................... 19
  2.1.10 Consultant Invoicing & Documentation ....................... 20

2.2 Pre-Design and Schematic Design Phases ......................... 21
  2.2.1 General ...................................................................... 21
  2.2.2 Client-Supplied Information .......................................... 21
  2.2.3 Site Analysis ............................................................... 21
  2.2.4 Program of Requirements ............................................ 22
  2.2.5 Room Numbering ........................................................ 22
  2.2.6 Changes to the Program of Requirements .................... 23
  2.2.7 Input by Subconsultants .............................................. 23
  2.2.8 Schematic Design Report ............................................ 23
  2.2.9 Municipal and Regulatory Approvals ........................... 24
  2.2.10 Project Governance .................................................... 24

2.3 Design Development Phase .............................................. 25
  2.3.1 General ...................................................................... 25
  2.3.2 Material & Material Samples ........................................ 25
  2.3.3 Coordination of Exterior Architectural Expression and Internal Spaces .................................................................................. 25
  2.3.4 Art .............................................................................. 25
  2.3.5 Coordination with Subconsultants ................................ 25
  2.3.6 Design Development Report ......................................... 27
  2.3.7 Review by FMD Workplace Safety and Environmental Protection (WSEP) ......................................................... 28
  2.3.8 Review by Protective Services ...................................... 29
  2.3.9 Municipal Approvals .................................................... 29
  2.3.10 Room Work Sheets ..................................................... 29

2.4 Construction Documentation Phase .................................. 31
  2.4.1 General ...................................................................... 31
  2.4.2 Working Drawings ....................................................... 31
2.4.3 Project Manual - Front End Documents ......................................................... 36
2.4.4 Project Manual - Specifications .................................................................... 37
2.4.5 Controls Design and Scope of Work ............................................................... 39
2.4.6 Building Code Review ................................................................................... 41
2.4.7 Review by Facilities Management Division ................................................... 41
2.4.8 Review by FMD - Workplace Safety and Environmental Protection (WSEP) .......... 41
2.4.9 Review by Acoustical Specialist .................................................................... 42
2.4.10 University Approvals .................................................................................. 42
2.4.11 Municipal Review and Approval ................................................................. 42
2.4.12 Regulatory Review and Approval .................................................................. 42
2.5 Bidding and Negotiation Phase ....................................................................... 44
2.5.1 General ........................................................................................................ 44
2.5.2 Advertising of Tender, Bidding Procedures, Tender Opening .................... 44
2.5.3 Addenda ....................................................................................................... 44
2.5.4 Analysis of Bids and Awarding of Contract ................................................... 44
2.6 Construction Phase ....................................................................................... 46
2.6.1 General ........................................................................................................ 46
2.6.2 Consultant’s Responsibilities ........................................................................ 46
2.6.3 Invoice Approval .......................................................................................... 48
2.6.4 Invoice Payment ........................................................................................... 48
2.6.5 Cost Reporting ............................................................................................. 48
2.6.6 Payment Terms ............................................................................................ 49
2.6.7 Independent Testing and Inspection .............................................................. 49
2.6.8 Building Project Signs .................................................................................. 49
2.6.9 Obstructions to Traffic ................................................................................. 49
2.6.10 Security and Protection of Property ............................................................ 50
2.6.11 Use of Building Equipment During Construction ....................................... 50
2.6.12 Utilities ...................................................................................................... 50
2.6.13 Construction Scheduling ............................................................................ 50
2.6.14 Key Control ................................................................................................. 50
2.7 Close-Out & Post-Construction ...................................................................... 52
2.7.1 General ........................................................................................................ 52
2.7.2 Substantial Performance of the Work ............................................................ 52
2.7.3 Release of Holdback ..................................................................................... 52
2.7.4 Permits & Certificates of Authorization ....................................................... 52
2.7.5 Record Drawings .......................................................................................... 52
2.7.6 Operating & Maintenance Manuals .............................................................. 53
2.7.7 Demonstration & Training .......................................................................... 53
2.7.8 Warranties & Deficiencies ......................................................................... 53
2.7.9 Statement of Completion ............................................................................. 54
2.7.10 Final Certificate for Payment ...................................................................... 54
2.7.11 Building Systems Commissioning ............................................................... 54
2.7.12 Warranty Reviews ...................................................................................... 54
2.7.13 Thermography ............................................................................................. 54

3.0 Design Principles .......................................................................................... 55
3.1 General ........................................................................................................... 55
3.2 Beauty ............................................................................................................. 55
3.3 Durability and Sustainability (Section Under Development) ............................ 55
3.4 Heritage Preservation ...................................................................................... 61
3.5 Economy & Ease of Maintenance ..................................................................... 62
3.6 Flexibility ....................................................................................................... 62
3.7 Accessibility .................................................................................................... 62
3.8 Safety and Security .................................................................................................................. 64

4.0 Overall Building Design ........................................................................................................ 67

4.1 General .................................................................................................................................. 67
4.2 Building Siting ......................................................................................................................... 67
4.2.1 General Planning Considerations - Meewasin Valley Authority ........................................... 67
4.2.2 General Planning Considerations - City of Saskatoon Zoning Bylaw ...................................... 67
4.2.3 General Planning Considerations - Core Area Master Plan ................................................. 67
4.2.4 College Quarter Master Plan .............................................................................................. 71
4.2.5 Other University Planning Considerations .......................................................................... 71
4.3 Relationship to Physical & Historical Context ........................................................................ 71
4.4 Building Height & Massing ..................................................................................................... 71

5.0 Functional Spaces ................................................................................................................... 73

5.1 General .................................................................................................................................. 73
5.1.1 Scope .................................................................................................................................. 73
5.1.2 Functional Space Categories .............................................................................................. 73
5.2 Classroom Facilities (Category 01) .......................................................................................... 75
5.2.1 General ................................................................................................................................ 75
5.2.2 Location, Design & Dimensions .......................................................................................... 75
5.2.3 Flooring Materials & Finishes ............................................................................................. 76
5.2.4 Wall Materials & Finishes .................................................................................................... 76
5.2.5 Ceiling Materials & Finishes .............................................................................................. 76
5.2.6 Doors & Windows ................................................................................................................. 76
5.2.7 Acoustic ................................................................................................................................ 77
5.2.8 HVAC .................................................................................................................................. 77
5.2.9 Plumbing ............................................................................................................................... 77
5.2.10 Electrical ............................................................................................................................. 77
5.2.11 Communications & Media ................................................................................................... 78
5.2.12 Fittings, Furnishings & Millwork .......................................................................................... 79
5.3 Instructional & Research Laboratory Spaces (Categories 02 & 03) ............................................. 80
5.3.1 General ................................................................................................................................ 80
5.3.2 Reference Standards .............................................................................................................. 80
5.3.3 Location, Design & Dimensions .......................................................................................... 81
5.3.4 Flooring Materials & Finishes ............................................................................................. 81
5.3.5 Wall Materials & Finishes .................................................................................................... 82
5.3.6 Ceiling Materials & Finishes .............................................................................................. 82
5.3.7 Doors & Windows ................................................................................................................. 82
5.3.8 Acoustic ................................................................................................................................ 83
5.3.9 HVAC .................................................................................................................................. 83
5.3.10 Plumbing ............................................................................................................................... 83
5.3.11 Electrical ............................................................................................................................. 84
5.3.12 Fire Protection ...................................................................................................................... 84
5.3.13 Communications & Media ................................................................................................... 84
5.3.14 Fittings, Furnishings & Millwork .......................................................................................... 85
5.3.15 Laboratory Equipment ........................................................................................................ 85
5.4 Academic and Administrative Offices (Categories 04 & 10) .................................................... 89
5.4.1 General ................................................................................................................................ 89
5.4.2 Location, Design & Dimensions .......................................................................................... 89
5.4.3 Flooring Materials & Finishes ............................................................................................. 89
5.4.4 Wall Materials & Finishes .................................................................................................... 89
5.4.5 Ceiling Materials & Finishes ................................................................. 89
5.4.6 Doors & Windows ............................................................................... 90
5.4.7 Acoustic ........................................................................................... 90
5.4.8 HVAC ............................................................................................. 90
5.4.9 Plumbing ......................................................................................... 90
5.4.10 Electrical ........................................................................................ 90
5.4.11 Communications ............................................................................. 90
5.4.12 Fittings, Furnishings & Millwork ....................................................... 90

5.5 Meeting Rooms (Categories 04 & 10) .................................................. 92
5.5.1 General ........................................................................................... 92
5.5.2 Location, Design & Dimensions ....................................................... 92
5.5.3 Flooring Materials & Finishes .......................................................... 92
5.5.4 Wall Materials & Finishes ................................................................. 92
5.5.5 Ceiling Materials & Finishes .............................................................. 92
5.5.6 Doors & Windows ........................................................................... 92
5.5.7 Acoustic ........................................................................................... 92
5.5.8 HVAC ............................................................................................. 93
5.5.9 Electrical ........................................................................................ 93
5.5.10 Communications ............................................................................. 93
5.5.11 Fittings, Furnishings & Millwork ....................................................... 93

5.6 Library Facilities (Category 05) ............................................................... 94
5.6.1 General ........................................................................................... 94
5.6.2 Location, Design & Dimensions ....................................................... 94
5.6.3 Flooring Materials & Finishes .......................................................... 94
5.6.4 Wall Materials & Finishes ................................................................. 94

5.7 Athletic & Recreational Space (Category 06) ........................................ 95
5.7.1 General ........................................................................................... 95
5.7.2 Location, Design & Dimensions ....................................................... 95
5.7.3 Flooring Materials & Finishes .......................................................... 95
5.7.4 Wall Materials & Finishes ................................................................. 95
5.7.5 Ceiling Materials & Finishes .............................................................. 95
5.7.6 Doors & Windows ........................................................................... 95
5.7.7 Acoustic ........................................................................................... 95
5.7.8 HVAC ............................................................................................. 95
5.7.9 Plumbing ......................................................................................... 95
5.7.10 Electrical ........................................................................................ 95
5.7.11 Communications ............................................................................. 95
5.7.12 Fittings, Furnishings & Millwork ....................................................... 95

5.8 Change Rooms & Shower Rooms (Category 06) .................................... 96
5.8.1 General ........................................................................................... 96
5.8.2 Location, Design & Dimensions ....................................................... 96
5.8.3 Flooring Materials & Finishes .......................................................... 96
5.8.4 Wall Materials & Finishes ................................................................. 96
5.8.5 Ceiling Materials & Finishes .............................................................. 96
5.8.6 Plumbing ......................................................................................... 97
5.8.7 Electrical ........................................................................................ 97
5.8.8 Fittings, Furnishings & Millwork ....................................................... 97

5.9 Food Service Facilities (Category 07) ..................................................... 99
5.9.1 General ........................................................................................... 99
5.9.2 Location, Design & Dimensions ....................................................... 99
5.9.3 Flooring Materials & Finishes .......................................................... 99
5.9.4 Wall Materials & Finishes ................................................................. 99
5.9.5 Ceiling Materials & Finishes .............................................................. 99
5.9.6 Doors & Windows ........................................................................... 99
5.9.7 Acoustic ........................................................................................... 99

□
5.9.8 HVAC ........................................................................................................... 99
5.9.9 Plumbing ......................................................................................................... 99
5.9.10 Electrical ........................................................................................................ 99
5.9.11 Communications .......................................................................................... 100
5.9.12 Fittings, Furnishings & Millwork ................................................................. 100

5.10 Common Use Space and Student Activity Space (Category 14) .................. 101
5.10.1 General ......................................................................................................... 101
5.10.2 Location, Design & Dimensions ................................................................ 101
5.10.3 Flooring Materials & Finishes ................................................................. 101
5.10.4 Wall Materials & Finishes ........................................................................ 101
5.10.5 Ceiling Materials & Finishes .................................................................... 101
5.10.6 Doors & Windows ....................................................................................... 101
5.10.7 Acoustic ...................................................................................................... 101
5.10.8 HVAC ......................................................................................................... 101
5.10.9 Plumbing .................................................................................................... 101
5.10.10 Electrical ................................................................................................ 101
5.10.11 Communications ....................................................................................... 101
5.10.12 Fittings, Furnishings & Millwork ............................................................. 101

5.11 Assembly and Exhibition Facilities (Category 15) ...................................... 102
5.11.1 General ....................................................................................................... 102
5.11.2 Location, Design & Dimensions ................................................................ 102
5.11.3 Flooring Materials & Finishes .................................................................... 102
5.11.4 Wall Materials & Finishes ........................................................................ 102
5.11.5 Ceiling Materials & Finishes .................................................................... 102
5.11.6 Doors & Windows ....................................................................................... 102
5.11.7 Acoustic ...................................................................................................... 102
5.11.8 HVAC ......................................................................................................... 102
5.11.9 Plumbing .................................................................................................... 102
5.11.10 Electrical ................................................................................................ 102
5.11.11 Communication ....................................................................................... 102
5.11.12 Fittings, Furnishings & Millwork ............................................................. 102

5.12 Main Public Entrances & Lobbies (Category 16) ......................................... 103
5.12.1 General ....................................................................................................... 103
5.12.2 Location, Design & Dimensions ................................................................ 103
5.12.3 Flooring Materials & Finishes .................................................................... 104
5.12.4 Wall Materials & Finishes ........................................................................ 104
5.12.5 Ceiling Materials & Finishes .................................................................... 104
5.12.6 Doors & Windows ....................................................................................... 104
5.12.7 HVAC ......................................................................................................... 104
5.12.8 Electrical ................................................................................................... 105
5.12.10 Fittings, Furnishings & Millwork ............................................................. 105

5.13 Secondary Public Entrances (Category 16) .................................................. 106
5.13.1 General ....................................................................................................... 106
5.13.2 Location, Design & Dimensions ................................................................ 106
5.13.3 Flooring Materials & Finishes .................................................................... 106
5.13.4 Wall Materials & Finishes ........................................................................ 106
5.13.5 Ceiling Materials & Finishes .................................................................... 106
5.13.6 Doors & Windows ....................................................................................... 106
5.13.8 Electrical ................................................................................................... 107
5.13.9 Fittings, Furnishings & Millwork ............................................................... 107

5.14 Service Entrances (Category 16) ................................................................. 108
5.14.1 General ....................................................................................................... 108
5.14.2 Location, Design & Dimensions ................................................................ 108
5.14.3 Flooring Materials & Finishes .................................................................... 108
5.14.4 Wall Materials & Finishes ........................................................................ 108
5.15 Materials Transfer Room (Category 16) ............................................. 112
  5.15.1 General .......................................................................................... 112
  5.15.2 Location, Design & Dimensions .................................................... 112
  5.15.3 Flooring Materials & Finishes ....................................................... 112
  5.15.4 Wall Materials & Finishes ............................................................. 112
  5.15.5 Ceiling Materials & Finishes ......................................................... 112
  5.15.6 Doors & Windows ........................................................................ 112
  5.15.7 Acoustic ........................................................................................ 112
  5.15.8 HVAC .......................................................................................... 112
  5.15.9 Plumbing ..................................................................................... 113
  5.15.10 Electrical .................................................................................... 113
  5.15.11 Communications ....................................................................... 113
  5.15.12 Fittings, Furnishings & Millwork ................................................ 113

5.16 Circulation (Category 16) ................................................................. 114
  5.16.1 General ........................................................................................ 114
  5.16.2 Location, Design & Dimensions .................................................... 114
  5.16.3 Flooring Materials & Finishes ....................................................... 114
  5.16.4 Wall Materials & Finishes ............................................................. 115
  5.16.5 Ceiling Materials & Finishes ......................................................... 115
  5.16.6 Doors & Windows ........................................................................ 115
  5.16.7 HVAC .......................................................................................... 115
  5.16.8 Electrical ..................................................................................... 115
  5.16.9 Fittings, Furnishings & Millwork ................................................ 115

5.17 Stairs & Stairwells (Category 16) ..................................................... 117
  5.17.1 General ........................................................................................ 117
  5.17.2 Location & Dimensions ............................................................... 117
  5.17.3 Flooring Materials & Finishes (Including Treads) ....................... 117
  5.17.4 Wall Materials & Finishes ............................................................. 117
  5.17.5 Ceiling Materials & Finishes ......................................................... 117
  5.17.6 Doors & Windows ........................................................................ 118
  5.17.7 HVAC .......................................................................................... 118
  5.17.8 Electrical .................................................................................... 118
  5.17.9 Fittings, Furnishings and Millwork ................................................ 118

5.18 Elevators (Category 16) ................................................................. 119
Refer to Part 6.0, Section D1010 - Elevators ............................................ 119

5.19 Washrooms (Category 16) .............................................................. 120
  5.19.1 General ........................................................................................ 120
  5.19.2 Location, Design & Dimensions .................................................... 120
  5.19.3 Flooring Materials & Finishes ....................................................... 120
  5.19.4 Wall Materials & Finishes ............................................................. 120
  5.19.5 Ceiling Materials & Finishes ......................................................... 120
  5.19.6 Doors & Windows ........................................................................ 120
  5.19.7 Acoustic ........................................................................................ 120
  5.19.8 HVAC .......................................................................................... 120
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.20</td>
<td>Emergency Showers &amp; Eye Washes (Category 16)</td>
</tr>
<tr>
<td>5.20.1</td>
<td>General</td>
</tr>
<tr>
<td>5.20.2</td>
<td>Reference Standards</td>
</tr>
<tr>
<td>5.20.3</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.20.4</td>
<td>Flooring Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.20.5</td>
<td>Wall Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.20.6</td>
<td>HVAC</td>
</tr>
<tr>
<td>5.20.7</td>
<td>Plumbing</td>
</tr>
<tr>
<td>5.20.8</td>
<td>Electrical</td>
</tr>
<tr>
<td>5.20.9</td>
<td>Signage</td>
</tr>
<tr>
<td>5.20.10</td>
<td>Fittings, Furnishings &amp; Millwork</td>
</tr>
<tr>
<td>5.20.11</td>
<td>Retrofit Applications</td>
</tr>
<tr>
<td>5.21</td>
<td>Photocopiier/Printer Stations (Category 16)</td>
</tr>
<tr>
<td>5.21.1</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.21.2</td>
<td>HVAC</td>
</tr>
<tr>
<td>5.21.3</td>
<td>Electrical</td>
</tr>
<tr>
<td>5.21.4</td>
<td>Fittings, Furnishings &amp; Millwork</td>
</tr>
<tr>
<td>5.22</td>
<td>Waste and Recycle Collection Points (Category 16)</td>
</tr>
<tr>
<td>5.22.1</td>
<td>General</td>
</tr>
<tr>
<td>5.22.2</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.22.3</td>
<td>Fittings, Furnishings &amp; Millwork</td>
</tr>
<tr>
<td>5.23</td>
<td>Mechanical &amp; Electrical Rooms (Category 16)</td>
</tr>
<tr>
<td>5.23.1</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.23.2</td>
<td>Flooring Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.23.3</td>
<td>Wall Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.23.4</td>
<td>Ceiling Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.23.5</td>
<td>Doors &amp; Windows</td>
</tr>
<tr>
<td>5.23.6</td>
<td>Acoustic</td>
</tr>
<tr>
<td>5.23.7</td>
<td>HVAC</td>
</tr>
<tr>
<td>5.23.8</td>
<td>Plumbing</td>
</tr>
<tr>
<td>5.23.9</td>
<td>Electrical</td>
</tr>
<tr>
<td>5.23.10</td>
<td>Communications &amp; Data</td>
</tr>
<tr>
<td>5.23.11</td>
<td>Fittings, Furnishings &amp; Millwork</td>
</tr>
<tr>
<td>5.24</td>
<td>Communications Closets (Category 16)</td>
</tr>
<tr>
<td>5.24.1</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.24.2</td>
<td>Flooring Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.24.3</td>
<td>Wall Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.24.4</td>
<td>Ceiling Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.24.5</td>
<td>HVAC</td>
</tr>
<tr>
<td>5.24.6</td>
<td>Electrical</td>
</tr>
<tr>
<td>5.25</td>
<td>Custodial Lounge (Category 16)</td>
</tr>
<tr>
<td>5.25.1</td>
<td>General</td>
</tr>
<tr>
<td>5.25.2</td>
<td>Location, Design &amp; Dimensions</td>
</tr>
<tr>
<td>5.25.3</td>
<td>Flooring Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.25.4</td>
<td>Wall Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.25.5</td>
<td>Ceiling Materials &amp; Finishes</td>
</tr>
<tr>
<td>5.25.6</td>
<td>HVAC</td>
</tr>
<tr>
<td>5.25.7</td>
<td>Plumbing</td>
</tr>
<tr>
<td>5.25.8</td>
<td>Electrical</td>
</tr>
<tr>
<td>5.25.9</td>
<td>Communications &amp; Data</td>
</tr>
<tr>
<td>5.25.10</td>
<td>Fittings, Furnishings &amp; Millwork</td>
</tr>
<tr>
<td>5.26</td>
<td>Custodial Supply Room (Category 16)</td>
</tr>
</tbody>
</table>
5.26.1 General .......................................................... 138
5.26.2 Location, Design & Dimensions .......................... 138
5.26.3 Flooring Materials & Finishes ......................... 138
5.26.4 Wall Materials & Finishes ............................... 138
5.26.5 Ceiling Materials & Finishes ......................... 138
5.26.6 HVAC ......................................................... 138
5.26.7 Plumbing ................................................... 139
5.26.8 Electrical .................................................... 139
5.26.9 Fittings, Furnishings & Millwork ...................... 139
5.27 Custodial Closet (Category 16) .............................. 140
5.27.1 Location, Design & Dimensions ........................ 140
5.27.2 Flooring Materials & Finishes .......................... 140
5.27.3 Wall Materials & Finishes ............................... 140
5.27.4 Ceiling Materials & Finishes ........................... 140
5.27.5 Doors & Windows ........................................ 140
5.27.6 HVAC ......................................................... 140
5.27.7 Plumbing .................................................. 141
5.27.8 Electrical .................................................... 141
5.27.9 Fittings, Furnishings & Millwork ...................... 141
5.28 Grounds Room (Category 16) ............................... 142
5.28.1 General .......................................................... 142
5.28.2 Location, Design & Dimensions ........................ 142
5.28.3 Flooring Materials & Finishes ......................... 142
5.28.4 Wall Materials & Finishes ............................... 142
5.28.5 Ceiling Materials & Finishes ........................... 142
5.28.6 Doors & Windows ........................................ 142
5.28.7 HVAC ......................................................... 142
5.28.8 Plumbing .................................................. 142
5.28.9 Electrical .................................................... 142
5.28.10 Fittings, Furnishings & Millwork .................... 143
5.29 Bicycle Storage Room (Category 16) ..................... 144
5.29.1 General .......................................................... 144
5.29.2 Location, Design & Dimensions ........................ 144
5.29.3 Flooring Materials & Finishes ......................... 144
5.29.4 Wall Materials & Finishes ............................... 144
5.29.5 Ceiling Materials & Finishes ........................... 144
5.29.6 Doors & Windows ........................................ 144
5.29.7 HVAC ......................................................... 144
5.29.8 Plumbing .................................................. 144
5.29.9 Electrical .................................................... 144
5.29.10 Fittings, Furnishings & Millwork .................... 145
5.30 Residential Space (Category 17) ......................... 146
5.30.1 General .......................................................... 146
5.30.2 Location, Design & Dimensions ........................ 146
5.30.3 Flooring Materials & Finishes ......................... 146
5.30.4 Wall Materials & Finishes ............................... 146
5.30.5 Ceiling Materials & Finishes ........................... 146
5.30.6 Doors & Windows ........................................ 146
5.30.7 Acoustic ....................................................... 146
5.30.8 HVAC ......................................................... 146
5.30.9 Plumbing .................................................. 146
5.30.10 Electrical .................................................... 146
5.30.11 Communications ........................................ 146
5.30.12 Fittings, Furnishings & Millwork .................... 146
5.31 Animal Space (Category 18) ................................. 147
5.31.1 General ........................................................................................................ 147
5.31.2 Reference Standards .................................................................................. 147
5.31.3 Location, Design & Dimensions ................................................................. 148
5.31.4 Flooring Materials & Finishes .................................................................... 149
5.31.5 Wall Materials & Finishes ......................................................................... 149
5.31.6 Ceiling Materials & Finishes ...................................................................... 150
5.31.7 Doors & Windows ...................................................................................... 150
5.31.8 Acoustic ...................................................................................................... 151
5.31.9 HVAC ......................................................................................................... 151
5.31.10 Plumbing .................................................................................................. 151
5.31.11 Electrical .................................................................................................. 152
5.31.12 Fire Protection ......................................................................................... 152
5.31.13 Fittings, Furnishings & Millwork ............................................................... 152
5.31.14 Equipment ............................................................................................... 153

5.32 Parking Structures (Category 19) ................................................................ 154
5.32.1 General ...................................................................................................... 154
5.32.2 Location, Design & Dimensions ................................................................ 154
5.32.3 Flooring Materials & Finishes .................................................................... 154
5.32.4 Wall Materials & Finishes ......................................................................... 154
5.32.5 Doors & Windows ...................................................................................... 154
5.32.6 HVAC ......................................................................................................... 154
5.32.7 Plumbing .................................................................................................... 154
5.32.8 Electrical .................................................................................................... 154
5.32.9 Communications & Data ........................................................................... 154
5.32.10 Fittings, Furnishings & Millwork ............................................................... 155

6.0 Assemblies and Systems .................................................................................. 156

6.1 General ........................................................................................................... 156

6.2 Technical Guidelines ....................................................................................... 157

A. Substructure ..................................................................................................... 157
A10 Foundations .................................................................................................. 157
A1010 Standard Foundations .............................................................................. 157
A1013 Perimeter Drainage & Insulation ................................................................. 159
A1014 Foundation Water-proofing ...................................................................... 161

B. Shell ............................................................................................................... 163
B10 Superstructure .............................................................................................. 163
B1010 Floor Construction ................................................................................... 163
B1020 Roof Construction ................................................................................... 164
B1021 Low-Slope Roofs .................................................................................... 165
B1022 Pitched Metal Roofs ................................................................................. 168
B1029 Other Roof Systems ................................................................................ 170
B20 Exterior Enclosure ....................................................................................... 170
B2010 Exterior Walls ......................................................................................... 171
B2020 Exterior Windows & Glazed Curtain wall ................................................ 180
B2030 Exterior Doors & Hardware .................................................................. 185
B30 Roofing ........................................................................................................ 190
B3010 Roof Coverings ....................................................................................... 190
B3020 Roof Openings ....................................................................................... 190

C. Interiors .......................................................................................................... 191
Section not used. Refer to Part 6, Section C3040 Painting

C10 Interior Construction
C1010 Partitions - General
C1011 Fixed Partitions
C1012 Demountable Modular Partitions
C1013 Retractable Partitions
C1017 Interior Glazing & Frames
C1020 Interior Doors
C1030 Fittings & Specialties
C1031 Toilet Partitions
C1033 Lockers
C1034 Ornamental Metals & Handrails
C1035 Signage
C1038 Whiteboards, Chalkboards, Tackboards, Display Cases, etc...
C1039 Washroom Accessories

C20 Stairs
C2010 Stair Construction
C2020 Stair Finishes

C30 Interior Finishes
C3010 Interior Wall Finishes
C3011 Acoustic Wall Treatment
C3012 Concrete & Masonry Wall Finishes
C3013 Wall Painting

C3014 Tile & Terrazzo
C3015 Wall Plastering
C3016 Gypsum Wall Board
C3017 Vinyl Wallcoverings
C3019 Other Wall Finishes
C3020 Interior Floor Finishes
C3021 Rubber Flooring
C3022 Carpet & Carpet Tile
C3023 Sealed Concrete Flooring
C3024 Masonry & Stone Flooring
C3027 Resilient Flooring
C3028 Wood Flooring
C3029 Terrazzo & Polished Concrete Flooring
C3030 Ceiling Finishes - General
C3031 Suspended Acoustic Ceiling Tile Systems
C3040 Painting

D10 Conveying Systems
D1010 Elevators
D1015 Wheelchair Lifts
D1020 Escalators & Moving Walks
D1030 Material Handling Systems

D. Services - Mechanical Services
D20 Plumbing
D30 HVAC
D40 Fire Protection
D. Services - Electrical
D50 Electrical
D5000 General
D5010 Electrical Service & Distribution
D5020 Lighting & Branch Wiring
D5030 Communication & Security ................................................................. 280
D5090 Other Electrical Systems ................................................................. 283

E. Equipment & Furnishings ........................................................................ 284
E10 Equipment ............................................................................................ 284
E1000 General ............................................................................................. 284
E1010 Commercial Equipment ................................................................. 284
E1020 Institutional Equipment ................................................................. 284
E20 Furnishings .......................................................................................... 286
E2010 Fixed Furnishings ............................................................................. 286
E2012 Fixed Millwork .................................................................................. 286
E2013 Blinds & Window Coverings ............................................................ 289
E2014 Fixed Floor Grilles & Mats ............................................................... 290
E2015 Fixed Multiple Seating ..................................................................... 291
E2016 Fixed Interior Landscaping ............................................................... 292
E2020 Movable Furnishings ....................................................................... 293

F. Special Construction & Demolition ........................................................ 294
F10 Special Construction ............................................................................. 294
F1030 Special Construction Systems .......................................................... 294
F1040 Special Facilities .............................................................................. 294
F1050 Special Controls & Instrumentation ............................................... 294
F20 Selective Building Demolition ............................................................... 295
F2010 Building Elements Demolition ......................................................... 295
F2015 Construction Waste Management .................................................. 297
F2020 Hazardous Components Abatement ............................................... 300

G. Sitework ................................................................................................ 302
G20 Site Improvements (Review w/ Darren Crilly) ..................................... 302
G2000 General .......................................................................................... 302
G2010 Roadways ....................................................................................... 303
G2020 Parking Lots .................................................................................... 304
G2030 Pedestrian Paving ......................................................................... 306
G2040 Site Development .......................................................................... 308
G2044 Signage .......................................................................................... 308
G2045 Site Furnishings ............................................................................. 308
G2050 Landscaping ................................................................................... 310
G30 Site Mechanical Utilities ...................................................................... 314
G3010 Water Supply .................................................................................. 314
G3020 Sanitary Sewer ............................................................................... 314
G3030 Storm Sewer .................................................................................. 314
G3040 Heating Distribution (Steam) ........................................................... 314
G3050 Cooling Distribution (Chilled Water) .............................................. 314
G3080 Underground Gas Distribution ....................................................... 314
G40 Site Electrical Utilities ......................................................................... 315
G4010 Electrical Distribution .................................................................... 315
G4020 Site Lighting .................................................................................... 316

Appendix A - University Drafting Standards .............................................. 317
1.0 Introduction

Part 1.0 of the Design Manual provides an introduction to the Manual itself. It describes the purpose of the Manual, its form and the procedures relating to its administration. Definitions of terms used in the document are provided. Basic requirements applicable to all Projects are listed here.

1.1 General

The University of Saskatchewan Design Manual (Design Manual, or Manual) describes and defines the University of Saskatchewan’s standards with respect to the design and construction of its buildings and grounds. It is intended to be issued to Consultants engaged in the design of Building and landscaping Projects at the University. All members of the Consultant Team are to be familiar with the contents of this Manual.

The Design Manual is intended to supplement the Client-Architect Agreement and the Agreement between Owner and Contractor. Where conflicts exist between the requirements of the Design Manual and the Client-Architect Agreement or the Agreement between Owner and Contractor, the requirements of the Client-Architect Agreement or the Agreement between Owner and Contractor shall take precedence.

The most recent edition of all applicable Canadian codes and standards are to be followed except where there are superseding Provincial or Municipal regulations or bylaws. Codes and standards specifically include, but are not limited to:

- Uniform Building and Accessibility Standards Act of Saskatchewan
- National Building Code of Canada
- National Plumbing Code of Canada
- Canadian Electrical Code
- National Fire Code of Canada
- Saskatchewan Occupational Health and Safety Act and Regulations
- Saskatchewan Passenger and Freight Elevator Act and Regulations

Regulatory codes and standards are to be considered minimum standards. Additional requirements are outlined in this Manual.

(Note: Should the Contract make reference to this Manual? Review with Dave Aucoin.)

It is expected that the design will incorporate the best proven building technology in all aspects including structure, building envelope, interior finishes and systems.

1.2 Units

Dimensions referred to in the Design Manual are in millimeters unless otherwise noted.

1.3 Terminology

In the Design Manual, the term “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the Design Manual; “should” is used to express a recommendation which is advised but not required; and “may” is used to express an option or that which is permissible within the requirements of the Design Manual.
1.4 Confidentiality Statement

All information regarding University policies, operations, finances and similar matters is of a confidential nature. The Consultant shall ensure this be brought to the attention of all parties within the Project. Publicity, advertising, photography or display shall not be undertaken by the Consultant, Contractor, Subcontractors or Suppliers, or anyone employed by them, for any part of this Project, without prior written approval from Facilities Management Division. All publicity in regard to the Project shall be directed by Facilities Management Division through the Communications Office - University Advancement and Community Engagement.

1.5 Form & Content

The University of Saskatchewan Design Manual is divided into 6 parts, as follows:

Part 1.0 Introduction: Introduces the Design Manual, defines its terms, and describes its purpose, form and the procedures relating to its administration. Basic requirements applicable to all Projects are listed here.

Part 2.0 Process: Describes the procedures to be followed by the Consultant Team during the design and construction of the Project.

Part 3.0 Design Principles: Sets out the basic principles or aims which have been established to guide all planning, design and construction Projects at the University of Saskatchewan.

Part 4.0 Overall Building Design: Describes general building design requirements, including building siting, University planning considerations, municipal planning requirements, building height limitations and building massing.

Part 5.0 Functional Spaces: Specifies the requirements to be met in designing rooms and spaces within the Building, based on the function of the proposed space.

Part 6.0 Assemblies and Systems: Specifies the requirements to be met in designing the building assemblies, systems and services.

The Manual is structured such that its requirements are ordered approximately from the more general to the more specific.
1.6 Maintenance of the Manual

The Design Manual is not intended to be a static document. The University recognizes that procedures and standards in building design and construction must evolve to adapt to changes in industry standards, market conditions, technologies and best practices. It is also appreciated that the design community is an engine of creativity in the building industry. The University encourages innovation and creative problem solving from its Architects, Engineers and Designers.

For these reasons, the Manual will be updated over time, so that it remains current and is responsive to input from its users. Facilities Management Division (FMD) encourages feedback and constructive criticism from its users, including external Consultants, contractors, project managers, FMD staff and the University community. FMD has established a standing Design Manual Committee, which will convene on a regular basis to review comments and suggestions, and to make recommendations for changes to the Manual. The chair of the Design Manual Committee will be responsible for implementing these changes by the regular publication of revisions to the Manual. In this way, it is hoped that the Design Manual will be improved over time, and will evolve to reflect the collaborative nature of design.

Suggestions for changes to the content of the Design Manual should be sent to:

Andrew Wallace
Associate Director of Space Management & Planning
Facilities Management Division
University of Saskatchewan
E-mail: andrew.wallace@usask.ca
Phone: (306) 966-6106

1.7 Exemptions from the Requirements of the Manual

In the development of the Design Manual, every effort has been made to consider the diversity of building types and program requirements encountered in a university setting. However, it is recognized that some of the standards and guidelines established here will not be applicable to every situation. If the Consultant thinks that a particular Building or part of a Building should be exempt from a requirement of the Manual, a request for exemption should be made in writing to the Client Representative. The Client Representative will forward this request to the appropriate party within FMD and will issue a timely response.

1.8 Definitions

Words and terms noted in italics in the Manual are defined as follows:

Consultant: The Consultant is the person or entity identified as such in the Client-Architect Agreement or in the Agreement Between Owner and Contractor. The Consultant may be an architect, an interior designer, a professional engineer, or other consultant, depending on the nature of the Project. The term Consultant means the Consultant or the Consultant’s authorized representative.

Client: The Client is normally “University of Saskatchewan”, but in some instances may be another entity affiliated with the University. The Client Representative will confirm this information for each Project.
Client Representative: The person designated by the University of Saskatchewan - Facilities Management Division to represent the University to the Consultant or the Contractor in matters pertaining to a specific Project. Depending on the stage of the Project, the Client Representative may be an FMD Planner, an FMD Development Manager, an FMD Project Manager or an external Project Manager.

Consultant Team: The Consultant Team comprises the Consultant and all Subconsultants.

Contract: The term Contract refers to the Agreement Between Owner and Contractor, unless otherwise noted.

Contractor: The Contractor is the person or entity identified as such in the Agreement Between Owner and Contractor. For the purposes of the Design Manual, the Contractor is the person or entity having a contract with the Owner to perform the Work. The term Contractor means the Contractor or the Contractor’s authorized representative.

Contract Documents: The Contract Documents are the documents listed as such in the Agreement Between Owner and Contractor, and normally include the Agreement Between Owner and Contractor, Definitions, The General Conditions of the Contract, Supplementary Conditions, Specifications, Drawings and Addenda.

Facilities Management Division (FMD): Facilities Management Division, or FMD, is the University’s administrative unit responsible for the planning, building and maintenance of the University’s buildings, land and infrastructure.

Owner: The Owner is the person or entity identified as such in the Agreement Between Owner and Contractor. The Owner is normally “University of Saskatchewan”, but in some instances may be another entity affiliated with the University. The Client Representative will confirm this information for each Project.

Project: The Project means the total construction contemplated of which the Work may be the whole or a part.

Project Manager: A person or company designated by the University of Saskatchewan - Facilities Management Division to represent the University to the Consultant or the Contractor in matters pertaining to a specific Project. A Project Manager may be a University employee or an external consultant.

Subconsultant: A Subconsultant is an architect, engineer, or other entity engaged by the Consultant. The term Subconsultant means the Subconsultant or the Subconsultant’s authorized representative.

Subcontractor: A Subcontractor is a person or entity having a direct contract with the Contractor to perform a part or parts of the Work, or to supply products worked to a special design for the Work.

Substantial Performance of the Work: Substantial Performance of the Work is as defined under the Builder’s Lien Act of the Province of Saskatchewan. For the purposes of this Manual, Substantial Performance of the Work shall be considered to have been reached when the Work is ready for use or is being used for the purpose intended and is so certified by the Consultant.

Work: The Work means the total construction and related services required by the Contract Documents.
2.0 Process

2.1 General

2.1.1. Preamble

Part 2.0 of the Design Manual describes the procedures to be followed by the Consultant Team during the design and construction of the Project. It follows the standard organization of the design and construction process into phases, as set out in The Canadian Standard Form of Agreement between Client and Architect: Document Six.

2.1.2. Documents

The documents governing the design of the Project will generally consist of the Client-Architect Agreement (RAIC Document Six), any Supplemental Contractual Conditions, the Design Manual, the Program of Requirements, and any other reports, drawings and documents as may be provided to supplement or modify information already provided. Sufficient copies of all documents will be provided for the Consultant Team’s use.

Any conflicts or discrepancies in any information provided shall be reported promptly to the University of Saskatchewan.

2.1.3. Owner / Client

The Owner/Client is generally “University of Saskatchewan”, but in some cases may be another legal entity. The Consultant should clarify this point with the Client Representative for each Project. The Client-Architect Agreement and all Owner-Contractor documents or contracts are to be designated in the name of the University of Saskatchewan, unless the Client Representative directs otherwise.

2.1.4. Project Governance

Day to day operation and administration of the University physical plant is provided by the Facilities Management Division (FMD). Within the University, responsibility for the management of capital projects lies with FMD. The project management processes of FMD have been developed to ensure control of design standards, schedule and budget.

Capital projects with a project budget exceeding $500,000 are classified as Major Capital Projects. Major Capital Projects require Board of Governors (Board) approval. Each Major Capital Project follows a rigorous governance process to ensure the University’s senior administration is able to monitor and lead Projects in accordance with the strategic directions of the University. That process includes the Facilities Management Division (FMD), the Financial Services Division (FSD), the Institutional Planning and Assessment (IPA) office, the office of Corporate Administration and Information Technology Services (ITS).

A Steering Committee will be formed to oversee each Project. The Steering Committee includes an academic/administrative program coordinator, who is responsible for defining the intent and scope of the Project. FMD will report to the Steering Committee and is responsible to ensure there is adequate planning to meet University user-group needs.
The Consultant will receive all direction from the FMD, through its Client Representative. During planning stages, the Client Representative will be the Project Development Coordinator/Manager, and during construction, the Client Representative will be a Project Manager designated by the FMD. All communication with the University shall be directed through the Client Representative. While extensive contact with the user groups will be normally be required during the course of the design process, such communication shall occur through the Client Representative.

During the design phase the Client Representative and others from the University will attend regular design and coordination meetings with the Consultant Team. The purpose of this review process is to obtain information on progress and attempt to avoid abortive work by noting conflicts with University policy or experience.

Overall responsibility for and final approval of all work is vested in the Board of Governors.

2.1.5. Consultant Selection

Of necessity, the University is vitally interested in the selection not only of the architectural firm or Consultant, but also in the Subconsultants and associates retained, and the project staff that will be utilized. The selection of all members of the Consultant Team is subject to approval of the University.

Preference will be given to Consultants and Subconsultants with the Canada Green Building Council (CaGBC) professional designation ‘LEED® Accredited Professional’, and who can demonstrate significant commitment to and experience with sustainable building design and processes.

2.1.6. Professional Services

Consultant Teams are required to utilize the “Integrated Design Process” and outline the schedule to be followed for the process. It is required that all Subconsultants be included in the design process from its inception. The Consultant shall keep all Subconsultants informed of all matters affecting their work throughout the design and construction stages.

When necessary, and subject to approval, specialists should be consulted to provide advice and assist in the design of certain aspects of the work. In such instances, the University may ask the Consultant to retain a specialist as part of the Consultant Team. In such instances, the Consultant will be compensated for additional services under the terms of the Client-Architect Agreement. The Consultant is required to coordinate with these specialists to ensure that their advice is obtained in a timely manner and is adequately incorporated into the design.

Certain aspects of the design, primarily surface site development, electrical utilities and portions of control systems will normally be carried out by the Facilities Management Division (FMD). It is the Consultant’s responsibility to ensure that the appropriate information is requested from the University to allow the Project design to proceed in a timely fashion.

The Interior Designer on FMD staff will select all loose furniture and furnishings for the building. This selection will complement the Consultant’s interior design and for this reason, the Consultant shall provide samples of finishes and colours and familiarize the Interior Designer with the building interiors. The University’s Interior Designer and the University Architect will review and approve all colours and finish materials. The general layout of furniture is the responsibility of the Consultant. The interior design of all other aspects of the building will be the responsibility of the Consultant.
The Consultant is responsible for incorporating Client instructions into the design, and to respond to all comments received from FMD. All Client instructions shall be documented, incorporated as agreed and shall be coordinated with the work of all Subconsultants.
2.1.7. *Project Scope*

1. The following items will normally be included in the *Contract* prepared and administered by the *Consultant*, and constructed as part of the *Contract*:
   - The building, including any links to other buildings, and including the integral building equipment and services,
   - Built-in furnishings and equipment except those specifically listed as not included,
   - Hard landscaping (roads, walks, parking and street hardware),
   - Interior and exterior signage and wayfinding.
   - Review and optimization of energy consumption for the proposed building.
   - Coordination of system design with the requirements of the University's Central Building Automation System. *(Note: Review w/ Dennis Woods)*
   - Controls. Refer to Part 2, Section 2.4.5 Controls Design & Scope of Work.

2. The following items will normally not be included in the *Contract*, and will be provided by the University. However, the *Consultant* will be required to assist FMD staff in the preliminary planning and co-ordination of these items:
   - Utilities, except those within the building and short runs underground.
   - Soft landscaping. *(Note: in some cases, depending on the workload of FMD Grounds Department, soft landscaping may be included as part of the Contract. Consultants should request confirmation from the Client Representative on a project-by-project basis.)*
   - Loose furnishings and equipment.
   - Art work.

3. The following items will not be included in the *Contract* and the *Consultant* will not be involved in their planning or design:
   - Clearing the site.
   - Moving into the building.
   - Consumable supplies required to put the building into service.
   - Maintenance and caretaking equipment.

2.1.8. *Building Envelope Specialist*

The University may engage a Building Envelope Specialist to review building envelope details. This review is directed at maintaining the envelope as an air-tight enclosure with fully effective insulation value. The *Consultant* is required to work with this specialist and ensure coordination of his requirements with other *Subconsultants* in order to provide a building which meets the environmental needs of the occupants and maintains the structural integrity of the building components. The identification of strategies and opportunities relating to the building envelope shall begin during the pre-design phase of the facility.

This review does not relieve the *Consultant* of the ultimate responsibility for providing a building design that results in a weather-tight, durable facility that provides the required level of energy performance.

2.1.9. *Drafting Standards & Units of Measure*
Refer to Appendix XXX for General CAD Requirements and Guidelines. It is required that all Consultants and Contractors follow these guidelines as applicable. Drawings shall be prepared in Metric unless otherwise agreed by Facilities Management Division.

2.1.10. Consultant Invoicing & Documentation

The following are some basic requirements for information that should appear on invoices submitted by Consultants. This basic information will help expedite the processing of invoices.

1. Progress:
   - show the contract phases
   - % breakdown of each phase
   - % completion to date

2. Basic fee to date:
   - Show contract fee calculation and total fee. e.g.: tender contract amount x % fee
   - fixed fee amount
   - per diem calculation; show classification and charge out rate
   - Show calculation of fee due this invoice. e.g.: % progress to date x total fee
   - less previous invoices
   - equals fee due this invoice
   - Show additional services or fees with brief description and total revised fee.

3. Goods and Service Tax (GST) and Education and Health Tax (PST):
   - GST shall be disclosed as a separate line item on the invoice.
   - PST shall be disclosed as a separate line item on the invoice.
   - Include on the invoice the method of calculating the PST.

4. Reimbursable expenses:
   - Show the total amount applicable to the current invoice but also include the total to date.
   - Provide copies of the invoices paid that make up the reimbursable expenses.

5. Supplementary Information:
   - Supplementary information may be requested to support calculations on the invoice. These should be provided on additional pages attached to the invoice.
   - Approved Change Orders: A listing of approved change orders shall be provided, indicating change order number, date, and amount.
   - A total to date of change orders should be added to contract amount to show current contract amount.
2.2. Pre-Design and Schematic Design Phases

2.2.1. General

During the Schematic Design phase, the Consultant, Client Representative and various user representatives will identify key issues of the Project and agree on the general architectural form required to accommodate them. This form is based on an understanding of the campus, the building site and the Program of Requirements.

2.2.2. Client-Supplied Information

The following information will be made available to the Consultant at the start of the Project, for information and guidance:

1. A complete Site Plan of the area designated for the Project, describing:
   - physical characteristics
   - legal limitations
   - topographic information
   - grades and lines of streets, alleys, pavements and adjoining property and structures
   - adjacent drainage
   - rights of way
   - restrictions
   - easements
   - encroachments
   - deed restrictions
   - boundaries and contours of the site
   - locations, dimensions and data pertaining to existing buildings, other improvements and trees
   - location of services and utilities, including storm and sanitary sewers, water, power, communications, steam, condensate and chilled water lines, and cathodic protection.

2. A written legal description of the site.

3. A plan of the campus.

4. Any required geotechnical and soils information.

5. A preliminary Program of Requirements for the Project.

6. Construction Budget for the Project. The Construction Budget forms part of an overall Project Budget which includes construction costs, non-construction costs, contingency and market escalation if applicable. Construction costs at this stage are either based on figures estimated by an external consultant or on a factor of the University’s latest construction costs per square foot. Non-construction costs are then applied at 25, 30 or 35% depending on the type of project. Contingency at this stage is normally 30% of construction and non-construction costs and market escalation may be applied to the construction value depending on the current conditions of the market and the expected timing of the Project (see section below on Contingency).

7. Time frame or schedule for the Project.

2.2.3. Site Analysis
The Consultant shall conduct an evaluation of the site identified by the University in relation to the Program of Requirements, the budget, and the construction schedule.

This analysis will include consideration of all existing conditions which may have an impact on the design, including:

1. Climate, prevailing winds, solar orientation.
2. Topography, drainage, water courses, visual characteristics, physical features, vegetation.
3. Geotechnical and soils information.
4. Immediate surroundings, including neighbouring structures, shading, solar access, noise, views and vistas. Particular attention shall be paid to any neighbouring structures of heritage significance.
5. Vehicular and pedestrian access.
6. Utilities and services.

2.2.4. Program of Requirements

The Program of Requirements is a document prepared by the Facilities Management Division (FMD) which normally includes the following information:

1. Project Overview.
2. Preliminary Site Plan and Site Requirements.
4. Preliminary functional space program.
5. Room Requirement Studies.
6. Spatial relationships and adjacencies required.
7. Floor Plan and Room Elevations. (Not provided in all instances).
8. Equipment List.

The Program of Requirements is prepared by FMD in cooperation with the user of the space. This document is the single written source of information concerning the scope of the Project and the detailed requirements of each space. It is intended to present design information to the user and to aid the Consultant in the development of his designs. It is not intended as a final design. Program areas are normally determined by Facilities Management Division, according to the University’s Space Allocation Standards, listed in Appendix B.

2.2.5. Room Numbering
Final room numbers are assigned by *Facilities Management Division* during the contract documents phase. To designate rooms during the initial design stages, Schematic and Preliminary plans should use space names and interim room numbers from the Program of Requirements.

### 2.2.6. Changes to the Program of Requirements

The *Consultant* should critically examine the Program of Requirements in all its aspects to ensure that the *Project* can be built to conform to those requirements and to suggest improvements. Where particular architectural solutions are implied by the Program of Requirements, these should not be treated as constraints. The Program of Requirements should be understood as a statement of functional need rather than one of architectural form or detail. Constructive criticism of the suggested solution, proposals for improvements and explorations of alternate approaches are all encouraged.

The room areas provided in the Room Requirement Studies are target areas deemed necessary and adequate to properly perform the function for which the room is being designed. It is expected that these areas will be used as target areas but that there will be variations. If it becomes apparent that target areas are not sufficient to perform the function requested, the University should be advised, and a change requested to the Program of Requirements.

Proposed changes to the Program of Requirements shall be brought to the attention of the *Facilities Management Division* for review and approval. The *Consultant* will advise the *Client Representative* of any effects proposed changes might have on the cost of the *Work* and on any conflicts with other aspects of the *Work*. Approved changes to the Program of Requirements will be issued by the *Client Representative* and only changes issued in this form are to be acted upon.

### 2.2.7. Input by Subconsultants

During the Schematic Design phase, all *Subconsultants* should become familiar with the site and the Program of Requirements, and should be active participants in the development of preliminary design solutions. Preliminary investigations into alternate building materials, systems and contractual methods should occur at this stage, and should be reviewed with the *Client Representative*. All input by *Subconsultants* shall be directed through the *Consultant*.

### 2.2.8. Schematic Design Report

A formal Schematic Design Report shall be presented to the *Client Representative* for review and approval. This will serve as a formal trial solution and as a means of evaluating the requirements, budget and financing. The Schematic Design Report shall include:

1. A site plan.
2. Floor plans, including service spaces, waste collection areas, and both vertical and horizontal circulation.
3. Vertical sections.
4. Sketch elevations of the building, including all visible roof-top mechanical equipment.
5. Location of air intakes and exhausts, including emergency generator engine exhaust.
6. Major furnishings and equipment locations.

7. Estimates of construction cost. Based on the Consultant’s Construction Cost Estimate, FMD will develop a Project Budget, including construction costs, non-construction costs, contingency and market escalation if applicable. Coordinate with Facilities Management Division.

8. Report of Gross and Net Area. (Refer to Appendix XXX) The areas should be determined with as much accuracy as possible, making due allowance for losses of area to duct shafts, telephone closets, computer termination closets, grounds tool rooms, electrical rooms or panels, structure or other possible encroachments upon the space.

9. Building Code Analysis. Conduct a review of the National Building Code as it relates to the Schematic Design, and provide a summary of those code items which may have an impact on the schematic design options. Report findings to the University’s Client Representative, and show Code Analysis on the first sheet of drawing sets, and as a separate Word file. The code analysis shall be undertaken in consultation with the Authority Having Jurisdiction (City of Saskatoon).

10. Preliminary schedule for design and construction start and completion.

11. Description of structural, mechanical and electrical systems.

12. Preliminary descriptions of key construction materials, products and finishes.

To designate rooms or space groups during the initial design stages, Schematic Design and Design Development plans should use the names from the Program of Requirements.

All documents shall be dated and identified with a number. Subsequent revisions shall be clearly identified and dated.

Following written approval of the Schematic Design Report, the Consultant may advance to the Design Development phase.

2.2.9. Municipal and Regulatory Approvals

The Consultant shall assemble and review all applicable requirements of Authorities Having Jurisdiction, including the Meewasin Valley Authority development approval process, and building code requirements. At the end of the Schematic Design phase, the Consultant shall submit the Schematic Plans to the Fire Commissioner and to the Elevator Inspection Branch of the Department of Labour, for comment.

2.2.10. Project Governance

Preliminary approval by the University Board of Governors (Board 1) normally occurs during the Pre-Design phase. A “Request for Decision” submission will be prepared and presented to the Board by Facilities Management Division staff. This submission will be made by FMD staff based on material prepared by the Consultant, normally including preliminary drawings, area calculations and cost estimates.
2.3. **Design Development Phase**

2.3.1. **General**

During the Design Development Phase, the scheme approved at the end of the Schematic Design Phase is refined and developed in greater detail.

2.3.2. **Material & Material Samples**

During the Design Development Phase, the Consultant shall advance his or her proposals for the types of materials and fixtures he or she contemplates using. This shall occur sufficiently early in this phase to allow the University reasonable opportunity to assess their merit. Where practical, the Consultant will procure samples of proposed materials and products. The proposal shall include floor, wall and ceiling surfacing materials throughout, windows, doors, hardware, chalkboard and tackboard materials, mechanical and electrical components or assemblies, sinks, lighting fixtures, and counter surfaces. Refer also to Appendix XXX.

The Consultant is directed to maximize the use of materials that embody sustainable design principles.

2.3.3. **Coordination of Exterior Architectural Expression and Internal Spaces**

During the Design Development Phase, the form, external appearance and architectural expression of the building shall be developed parallel with the development of the interior spaces. For example, decisions regarding placement and size of windows shall be made in consideration of the function, lighting requirements and proposed furnishing of the affected interior spaces. The external appearance of the building should in part be an expression of the functions of the spaces it contains.

2.3.4. **Art**

During the Design Development stage, the Consultant should advance for consideration proposals for integrated and movable art work in the building. The University will appoint an Art Committee for the Project to coordinate the provision of works of art for the Building. In general, a major piece and several minor pieces will be purchased for each building. The Consultant is a key member of the Project Art Committee and will be expected to contribute fully in the selection and placement of the works. Art works should be carefully integrated into the design of the spaces.

2.3.5. **Coordination with Subconsultants**

During the Design Development Phase, intensive collaboration between the Consultant and all Subconsultants is required.

1. During the Design Development Phase, the Consultant and Structural Engineer shall:
   - Develop alternative framing plans and evaluate all possible options for structural systems.
   - Resolve typical bay framing and member sizes.
   - Identify the size and location of openings through the structure for all work by other disciplines.
Consider the requirements of fire ratings and fire separations.
Make provision for all mechanical equipment and special equipment such as window washing equipment, loading dock equipment, slab depressions, roof-top equipment, etc...
Consider requirements for future expansion and flexibility.

2. During the Design Development Phase, the Consultant and Mechanical Engineer shall:

- Work with the Client Representative to determine whether the building will connect to the University’s central heating and cooling plants.
- Determine the requirements for special HVAC systems such as heat pumps and heat recovery systems.
- Identify size and location of major ducts and pipes.
- Determine the location, type and approximate size of all mechanical equipment.
- Become familiar with all University requirements for operation and maintenance of the mechanical systems, and the requirements of the University’s central monitoring and control system.
- Consider requirements for future expansion and flexibility.
- Determine requirements for and design systems for compressed air, gas, oxygen, vacuum etc...
- Pay particular attention to the Consultant’s design of the building envelope, and its thermal characteristics. Work with the Consultant in the development of passive solar strategies where possible. The mechanical systems shall be sized on the basis of a detailed understanding of the expected thermal performance characteristics of the building envelope, and shall aim to minimize energy use by the mechanical systems.
- Explore opportunities for natural ventilation and develop where feasible.
- Maximize water efficiency in the design of irrigation systems and the selection of plumbing fixtures.

3. During the Design Development Phase, the Consultant and Electrical Engineer shall:

- Determine the anticipated electrical load and allowances for future expansion.
- Determine the requirements of incoming electrical services and any space requirements for a vault or sub-station.
- Determine the distribution of power and utilization voltages.
- Determine the location of all electrical closets, communications rooms and duct shafts or banks.
- Select light fixtures and determine the requirements for ceiling systems and ceiling space.
- Design lighting layouts.
- Design, in collaboration with University of Saskatchewan - Division of Media and Technology and Information Technology Services, all required telecommunications and data systems, fire alarm systems, public address systems, intercom systems, remote controls.
- Design, in collaboration with University of Saskatchewan - Campus Safety and Security, the building surveillance and security systems. Current design standards for these systems will be provided by Campus Safety and Security.
- Where required, design card access system in collaboration with University of Saskatchewan - Campus Safety and Security and Facilities Management Division (FMD). Current design standards for these systems will be provided by FMD.
- Not that embedded conduits are not permitted unless the Client Representative directs otherwise.
2.3.6. Design Development Report

The work of the Design Development phase shall be documented and presented to the Client Representative for review and approval in the form of a Design Development Report. This Report shall include:

1. A description of the design and its objectives.

2. A site plan, containing sufficient detail to form the basis of the application for Development Review.

3. All floor plans.

4. All building elevations, including all visible roof-top mechanical equipment.

5. Sections.

6. Plans describing the structural, mechanical and electrical systems.

7. Details of significant design features and building materials.

8. Preliminary furniture and equipment layouts, indicating whether items are to be part of the Contract or not.

9. Preliminary locations for planters, display cabinets, notice boards, etc...

10. A model and/or presentation drawings, including interior and exterior perspective views, renderings, etc..., if requested by the Client Representative. If a model is commissioned, it will become the property of the University.

11. Samples of all chosen colours and materials. Colours and finishes are required at this stage in order to facilitate the coordination of mechanical and electrical fixtures, lighting levels, and furniture selection.

12. Results of the submission of Schematic Plans to the Fire Commissioner. Plans shall clarify the location of required fire separations, if any.

13. Results of submission of Schematic Plans to the Elevator Inspection Branch of the Department of Labour, and the classification the Department would put on the proposed elevators.

14. A building code analysis. The Consultant shall conduct a review of the National Building Code as it relates to the Design Development drawings, and provide a report of findings to the University’s Client Representative. The code analysis shall appear on the first sheet of the drawing set.

15. Reports, as applicable, from specialist consultants and advisors who provided guidance during the preliminary design stage.

16. Updated estimates of construction cost. At this stage FMD will develop a refined Project cost estimate, based on the Consultant’s construction cost estimate. Non-construction costs are developed on a line item basis by the Project Manager based on the requirements of the Project. Typically, contingency would be reduced to 20% at
the discretion of FMD. At this time any market escalation would be reviewed and may be refined based on the current market conditions, length of time to the tender and type of contract (i.e. stipulated sum or cost plus).

17. Report of gross and net areas (Refer to Appendix XXX) Total net and total gross areas provided in the Program of Requirements are intended as maximums and cannot be exceeded at any stage. Therefore, care should be taken to ensure that adequate provision has been made for service spaces, and allowances should be made for unanticipated encroachments on program areas. To aid the document review process, both the area assigned in the Program of Requirements and the area actually provided shall be noted on the drawings for each room. This information shall also be tabulated in spreadsheet form room by room, comparing area summaries from the Program of Requirements to areas actually provided.

18. Proposals for integrated and movable art work in the building.

19. Consumption and demand estimates for power, steam, chilled water and potable water.

20. Performance descriptions of the following:
   - Foundations and structural systems.
   - HVAC systems and distribution.
   - Sprinkler systems.
   - Controls.
   - Electrical systems.
   - Lighting and lighting fixtures.
   - Levels of natural and artificial illumination and methods for reducing solar glare and controlling heat gain.
   - Fire Alarm System.
   - Communications systems.
   - Security, surveillance and card access systems.

21. An energy simulation analysis report, including operating costs and energy consumption estimates. The Consultant shall ensure that the systems proposed are adequate to meet the requirements and that the spaces provided to accommodate the building systems are adequate for the systems proposed.

   For minimum energy performance requirements, refer to Part 3, Section 3.4 - Sustainability.

22. An outline specification, describing all proposed finishes, materials and construction systems in general terms, and providing basic information on appearance, texture, operating and performance criteria. Preliminary specifications shall be identified as such on the cover sheet, index and the first page of each division.

All documents shall be dated and identified with a number. Subsequent revisions shall be clearly identified and dated.

Following written approval of the Design Development Report, the Consultant may advance to the Construction Documentation phase.

2.3.7. Review by Workplace Safety and Environmental Protection (WSEP)
During the Design Development phase of the Project, the Consultant shall meet with the Client Representative and the Department of Workplace Safety and Environmental Protection (WSEP) to determine specific design requirements relating to occupational health and safety.

2.3.8. Review by Protective Services

During the Design Development phase of the Project, the Consultant shall meet with the Client Representative and U of S Protective Services to conduct a CPTED (Crime Prevention Through Environmental Design) review of the project. All major capital projects should undertake a CPTED review; however, it should be noted that projects located within Direct Control District (DCD7) of the City of Saskatoon Zoning Bylaw are required to submit a CPTED review to the City of Saskatoon as part of the Building Permit application process.

2.3.9. Municipal Approvals

The University of Saskatchewan main campus falls under the jurisdiction of the Meewasin Valley Authority (MVA). The goals of the MVA are:

- to protect the natural and heritage resources of the Meewasin Valley;
- to develop and encourage projects which enhance the natural and heritage resources and add to the quality of life in Saskatoon; and
- to increase understanding and awareness of the natural and heritage resources of the Meewasin Valley

Improvements proposed on university-owned land located within 300 metres of the shoreline require approval by the MVA through a Development Permit process. This approval process is intended to ensure that a proposed improvement is consistent with the Meewasin development plan, and ensure that the improvement takes account of the natural and heritage resources and other special characteristics of the site. Where a portion of a proposed improvement falls within this limit the entire proposed improvement requires MVA approval. This approval is required for new University buildings and alterations to existing buildings only if exterior appearance is changed. In addition, the MVA shall be advised of proposed on university-owned land located within 500 metres of the shoreline. For a description and map of University lands subject to the Development Permit process, visit:


MVA notifications and approvals take place at the end of the Design Development phase and submissions will be made by the University. Drawings for this submission will be prepared by the Consultant in consultation with Facilities Management Division. The Consultant may be required to assist in presenting the project to the MVA Board of Directors as part of the Development Review process. For more information on the MVA Development Review process, visit:

http://meewasin.com/development/development-review/

Plans for University buildings are exempt from consideration by the Regional Planning Commission.

2.3.10. Room Work Sheets
Room Work Sheets will be required unless otherwise directed by the Client Representative. The work sheets should be started after approval of the Design Development Report, and before the working drawings.

The Work Sheets will be used by the Consultant and the Facilities Management Division to check the design with the responsible user. They are also used to coordinate the location of equipment, fittings and services. A Work Sheet is required for each room and space in the Project and shall include:

- Floor plan.
- Reflected ceiling plan.
- Elevations of each wall.
- Work Sheets should be presented at 1:50 scale.
- All furniture & equipment shown in the Program of Requirements, both in contract and not in contract, are to be shown and labeled. Furniture and equipment are to be shown to scale, and may be drawn schematically. Critical dimensions for coordination are to be shown.
- All mechanical and electrical services are to be indicated and coordinated with other equipment and architectural features.
- Millwork and furniture elevations shall show critical dimensions, cupboard and drawer arrangements, latching, swings and locks.

Room Work Sheets are required by the University because they are used to facilitate design reviews by users who may be unfamiliar with standard architectural drawings. They have been found to be more easily understood by the users.

The Consultant is required to submit final copies of the Room Work Sheets to Facilities Management Division for approval before commencing work on the Working Drawings. The information contained in the Room Work Sheets is then transferred to the working drawings.
2.4. Construction Documentation Phase

2.4.1 General

The construction documents include the working drawings and the specifications. They form part of the tender documents, and subsequently form part of the construction Contract. They define the Work from a legal standpoint, and guide the Contractor in carrying out his or her work.

2.4.2 Working Drawings

The specific requirements of the working drawings will necessarily vary depending on the size and scope of the Project, and the type of construction contract. It is the Consultant’s responsibility to ensure that the Contract Documents fully describe the Work and are adequate for its size, level of complexity and the anticipated form of contract. However, the working drawings package shall normally include, at a minimum, the following:

1. General

   - Each sheet of the working drawings set shall have a title, shall be dated and numbered. All subsequent revisions shall be identified and dated.
   - The name, address and contact details of the Consultant or Subconsultant (as applicable) shall appear on each drawing. All tender and contract sets of drawings shall be sealed and signed.
   - The Client Representative will assign a Project name and Project number in conformance with University standards.
   - Working drawings shall contain a reference grid to facilitate review and construction.
   - The drawing scale shall be indicated
   - A North arrow shall be included on all plans.
   - The name or initials of the draftsperson and the individual who checked the drawings shall be indicated.
   - The site plan, all building elevations, all sections and all drawings showing service connections and landscaping shall note, in brackets for each elevation given, the corresponding geodetic elevation. Working drawings shall also note the equation to convert the reference datum to the geodetic datum used by the University. Any Project involving addition or alteration to an existing building shall use the same elevation datum as the existing building.

2. Context Plan and Project Information

The first sheet in the drawing set shall include:

   - A Context Plan at a reduced scale, indicating in a diagrammatic way the location of the building or addition in relation to existing buildings, streets and features of the campus. The Context Plan shall also indicate major landscaping features, parking lots and pedestrian paths.
   - Basic Project information, including the Project name, street address, legal description of the site, Project description and Client name.
   - A list of all members of the Consultant Team and their contact details.
   - A list of abbreviations used in the working drawings. Notes, symbols, abbreviations, dimensions and drawing references shall be applied consistently throughout the working drawings and shall use recognized conventions.
   - Drawing List, including all drawings in the set.
   - Building Code data.
3. Site Plan

The Site Plan shall include:

- The horizontal position of the building on the site, including critical dimensions to property lines or other fixed features such as the foundation walls of existing adjacent buildings.
- The vertical position of the building on the site, in the form of the ground floor elevation(s), and spot elevations at critical points around the building perimeter.
- Existing and proposed grading (spot elevations), drainage and landscaping. If a separate Landscape Plan is provided, it shall be carefully coordinated with the Site Plan.
- Parking, pedestrian walks, roads, curbs and other paving features.
- Exterior stairs and ramps.
- Exterior lighting and other electrical equipment.
- Utilities and other services and connections. Termination points for utilities, instead of being one meter out from the building or at the property line as in commercial practice, should be at a logical technical dividing point.
- Property lines, setbacks, rights of way, easements, etc…
- The extent of the construction shall be indicated.
- The area that the Contractor is permitted to use shall be indicated.
- The site shall be enclosed by a temporary fence, to prevent access by the general public. The extent of this fence shall be indicated on the Site Plan.
- Temporary roads and pedestrian paths shall be indicated on the Site Plan where disruptions to normal traffic are likely to be caused by construction activities. Appropriate protective measures, such as hoarding, temporary paving surfaces and fencing shall be indicated on the Site Plan and provided for in the specifications.
- The location and extent of workers’ parking areas, stockpile areas, temporary office and toilet areas and truck routes. These shall be determined in consultation with the University.
- Locations of spoil areas for disposal of surplus excavating materials. Indicate also how disposal is to be made (route, leveling, etc.). The Consultant shall contact the University for details.

4. Floor Plans

Floor Plans shall include:

- The structural system.
- An outline of the exterior walls, interior walls and service shafts.
- Dimensions of the structural grids, walls and partitions in relation to the structural system.
- Secondary dimensions to locate equipment and furnishings.
- Locations of windows, doors and other openings.
- Room names and numbers. Permanent room numbers will be assigned by Facilities Management Division.
- References to cross-sections and details.
- Built-in furniture, equipment and millwork.
- Location and design of interior planters.
- Locations of display cabinets, notice boards, tack boards, etc…
- Location of plumbing fixtures, diffusers, radiators & other fixed mechanical equipment.
• Location of floor drains, including floors sloped to drain.
• Stairs and ramps, including slope and location and extent of handrails.
• Cross-references to door and window schedules.
• Cross-references to wall-type schedule.
• Provide a separate set of drawings indicating the location and fire resistance rating of fire separations. Show also travel distance calculations.
• Location and extent of footing drains.
• Location and extent of basement waterproofing membrane.
• Items overhead shall be indicated with a dashed line.

5. Demolition Plans

For renovation Projects, demolition plans shall be prepared. These shall indicate:

• New work.
• Extent of renovations.
• Demolished work.

6. Roof Plan

The Roof Plan shall include:

• Type of roofing.
• Roof slopes.
• Location of roof drains, gutters and scuppers.
• Parapets and low walls.
• Location of roof access hatches & ladders.
• Location of skylights.
• Chimneys, vents and vent piping.
• Location and extent of roof walkways.
• Roof-top mechanical equipment, ducts, etc...
• Screening to mechanical equipment.
• References to cross-sections, details and roof types.

7. Reflected Ceiling Plans

Reflected Ceiling Plans shall include:

• Type, layout and level of suspended ceilings.
• Extent of areas of exposed structure.
• Location of light fixtures, ceiling diffusers, sprinkler heads, smoke baffles and any other ceiling-mounted equipment or fixtures.
• Location of skylights.
• Reflected Ceiling Plans are to be coordinated carefully with the mechanical and electrical drawings, and shall be used to locate the ceiling-mounted equipment and fixtures described in these drawings.

8. Sections
Sections illustrate the vertical dimension of spaces within the building and the vertical relationship between elements of the building. They are essential to understanding the building design. Building sections should be chosen strategically to represent both typical and atypical areas within the building. They should be used particularly to illustrate portions of the building that may be difficult to represent in plan. They shall illustrate:

- All building components that intersect with the section.
- All building components visible beyond the section cut.
- Room elevations shall be shown where the room is cut in section.
- Room names and numbers for spaces that are cut in section.
- Vertical dimensions of the main elements in relation to a reference elevation or level.
- Cross-references to detail drawings.
- Graphic indication of fire separations.
- Cross-references to a schedule or drawing of wall, floor, and roof assemblies.
- Cross-references to door and window schedules.

9. Elevations

Elevations illustrate the materials and dimensions of all exterior features. The elevations shall indicate:

- The structural grid.
- All building edges, including openings such as doors and windows.
- All exterior construction materials, indicated both graphically and with notes.
- Floor elevations (levels).
- All elements that penetrate walls or that are attached to the walls, such as light fixtures, signage, outlets, siamese connections, louvers, grilles, etc...
- All visible flashings, eavestroughs, rainwater pipes, etc...
- Guardrails and handrails.
- All roof-top mechanical equipment.
- Foundations and other below-grade elements shall be shown with dashed lines.
- Cross-references to detail drawings.
- Cross-references to door and window schedules.

10. Details

Details of the following conditions and elements are required:

- Vertical wall sections, from foundations to roof, for all typical and special conditions, including footings and foundation walls, intersections with floors, and intersections with roofs.
- Horizontal (plan) sections for intersections with structural elements and corners.
- Exterior window and door details, including head sections, sill section and jamb sections, for both typical and special conditions.
- Interior doors and frames.
- Stairs, including detail plans, detail sections, typical tread details, handrail and guardrail details, and connection details.
- Elevators, conveyors and chutes.
- Interior elevations of all rooms, including millwork, built-in furniture, interior materials, walls, doors and windows.
- All washrooms, including millwork, partitions, plumbing fixtures and accessories.
- Construction details of custom components and millwork.
• Assembly types. Often, typical assemblies for exterior walls, interior partitions, floors and roofs are presented together in a drawing or table, numbered and cross-referenced to plans and sections.

11. Schedules

Where appropriate, schedules may be used to present information, in written form, graphically or as a combination of both. Normally, such schedules include:

• Room finishes, including walls, floors and ceilings.
• Doors and door frames.
• Windows and window frames.
• Hardware.
• Assembly types.

All schedules listed above are required to be included as part of the Contract Documents. Elements contained in a schedule shall be numbered and cross-referenced to the other drawings.

Building hardware must be compatible with existing hardware systems. Keying will be specified by the University. For standard door hardware specification, refer to Part 6, Section B2030 - Exterior Doors & Hardware.

12. Mechanical Drawings

• Section Under Development

13. Electrical Drawings

Electrical schematics shall include a separate single line diagram for each of:

• Power distribution system, including the emergency power system.
• Telephone distribution system.
• Computer distribution system.
• Fire alarm system,
• Any other special system that may be incorporated in the proposed building.

Electrical schematics shall include all panels, junction boxes, racks, outlets and devices that are pertinent to the system. The use of single line diagrams is very important to maintenance as well as in reviewing/inspecting whether proper breakers, conduit size, fire alarm devices, etc., are being installed.

Schematics shall also be included for other special devices and equipment including but not limited to overhead doors and shutters and special lighting systems.

14. Landscape Drawings

The requirement for landscape drawings will be determined on a project-by-project basis. Where landscape drawings are required, they shall be carefully coordinated with the Architect’s site plan, and shall include:
• Existing and proposed grading (spot elevations) and drainage.
• Existing and proposed planting materials. For new plant materials, drawings shall designate quantity, common & botanical species names, size, condition and colour (where applicable). Planting details shall be provided.
• Areas of sod and seeded grass.
• All hard landscape surfaces, such as asphalt paving, granular paths, interlocking paving units, curbs and other paving features. Detail drawings of all paving materials are required.
• Exterior stairs and ramps.
• Exterior lighting and other electrical equipment.
• Property lines, setbacks, rights of way, easements, etc...

15. Coordination of Drawings

• Working drawings are to be fully coordinated across disciplines at the time of tender. When symbols or schematics are used, the Consultant shall ensure that all components and services are located appropriately, are properly integrated and are allocated adequate clearance for installation. Problems due to the interference of conflicting elements such as ductwork, light fixtures, piping and the structural framing system must be resolved before tender. The responsibility for coordination must not be left with the Contractor.
• The working drawings are to be fully coordinated with the specifications. The drawings and the specifications shall use the same generic terms, to avoid ambiguity.
• Client-supplied equipment shall be coordinated within the working drawings.

16. Completeness of Drawings

Working drawings are to be complete at the time of tender. The amount of design work and drafting required of the designers, builders and suppliers after the Project is tendered shall be kept to a minimum. The use of cash allowances and deferring detail-specific design shall be kept to a minimum.

2.4.3 Project Manual - Front End Documents

1. General

The Project Manual normally includes the following elements:

• Invitation to Bid
• Instructions to Bidders
• Bid Form
• Bid Form Supplement - Subcontractors
• Contract Form
• Definitions
• General Conditions of the Contract
• Supplementary Conditions of the Contract
• Insurance Requirements
• Specifications
All of these documents are bound together in a book that forms part of the tender documents, and later the construction Contract.

2. Front End Documents

At the beginning of the Construction Documents phase, the Consultant should ask the Client Representative to confirm the form of project delivery anticipated, type of construction contract required and the method of awarding the Contract. All tender documents shall follow the latest edition from the CCDC (Canadian Construction Documents Committee). All documents can be made available in electronic format by the University.

The University will provide standard construction tender front end templates for the Consultant’s use in the preparation of the tender documents. All changes to the General Conditions of the Contract will appear as Supplementary Conditions. The Client Representative will facilitate a consultation between the Consultant and Facilities Management Division, Risk Management and Insurance Services and Purchasing Services to determine which options should be selected in the tender front end templates.

Any requirements regarding the date of Substantial Performance of the Work, or the progress of construction relative to dates, shall be specified in The Instructions to Bidders. Move-in scheduling should also be considered within the design and construction process to ensure spaces are properly commissioned and ready for occupancy.

Prior to issuing the tender, the Consultant shall forward a draft of the front end documents to the Client Representative for review and approval.

3. Insurance and Bonds

Requirements for insurance, bid bonds, performance bonds and labour and material payment bonds shall be stipulated in the Instructions to Bidders and the Supplementary Conditions, and will be provided to the Consultant by the Client Representative. The University’s Department of Risk Management and Insurance Services will determine, on a case-by-case basis, whether Owner-provided insurance or contractor provided insurance will be required on a Project, and what liability limits will be required.

2.4.4 Project Manual - Specifications

1. General

Specifications shall be written in accordance with MasterFormat 1995. Where applicable, selected standard specification sections will be provided by the University for incorporation into the specifications. The University recognizes that MasterFormat 2004 has replaced the 1995 edition, however conversion of our standard specifications to this format is not yet available.

The Consultant shall ensure clauses in other sections are not at variance with those in the general conditions.

The use of alternatives shall be reviewed with the University prior to calling of tenders, and should be additive only. The use of deductive alternatives is to be avoided.
Specifications may be prepared using proprietary, prescriptive and performance methods, used individually or in combination. For proprietary specifications, a minimum of three (3) approved equivalent products shall normally be specified. Permission must be granted by the University to “sole source”, that is to specify a single proprietary product. An uncommon make should have the supplier’s name and address included to save time in bidding.

The term “or equal” shall be avoided in the specifications. The term “approved equivalent” is acceptable.

2. Independent Testing and Inspection

After the completion of the Working Drawings, the University and the Consultant will jointly determine any additional requirement for independent testing and inspection services. These services are additional to the General Review of the Work to be provided by the Consultant as stipulated in the Client-Architect agreement. Any requirement for independent testing and inspection services shall be stipulated in the specifications. The cost of such services will be borne by the University.

The Consultant shall make recommendations for quality control procedures for items including but not limited to the following:

- Building location
- Sub grade
- Base Materials
- Concrete
- Piling
- Masonry
- Air/Vapour Barriers
- Water-proofing Membranes
- Asphalt
- Reinforcing Steel
- Structural Steel
- Special Equipment and Systems
- Roofing and Flashing
- Windows
- Sealants
- Hardware
- Miscellaneous Metals
- Carpet / Flooring Finishes
- Surface Finish Materials
- Mechanical Equipment
- Air Balancing
- Electrical Equipment

3. Millwork, Built-In Furniture & Equipment

When the working drawings and specifications are being prepared the Consultant and University will jointly determine what is to be included in the main Contract, what is to be contracted separately, and what is to be purchased directly by the University. Very generally, loose items should be purchased by the University, and built-in or attached items should be included in the Contract(s).
Items not included in the *Contract* shall be shown on the drawings with dotted lines and labeled. This practice is to ensure that changes made during construction take account of the intended location of these items.

2.4.5 Controls Design and Scope of Work

The implementation of controls in new building projects is a different process than for other work being carried out on the *Project*. This is because a significant portion of this work is carried out by FMD forces as well as outside contractors. The scope of work for each party is outlined below. For design requirements, refer to Part 6, Section D30 - HVAC.

1. FMD Scope of Work - Controls Tender and Cash Allowance

Based on the consulting mechanical engineer’s design and sequences of operation the FMD Controls Design Group creates a set of controls tender documents. The controls tender is issued after the project tender. The reason it occurs after the main building tender is that the controls design group uses the mechanical design from the building tender set as a basis for design of the controls system. Because the controls tender occurs after the main building tender, a cash allowance is carried by the mechanical contractor in the building tender to cover the cost of the separate controls tender. The *Consultant* shall inclusion this cash allowance in the project tender documents, and coordinate with the *Client Representative* and FMD Controls Group to determine its amount.

The controls tender covers the supply and installation of pipe and wire/pneumatic tubing and the installation and termination of *Owner* supplied field devices. The amount carried for the cash allowance is determined by FMD’s mechanical engineer and controls design manager. The controls tender set includes all the information needed by the controls contractor to do this work, as well as information needed by FMD controls personnel to program and commission the controls system. The tender set also provides MCC starter circuits for use by the electrical contractor.

The mechanical contractor receives the bids for the controls tender and the *Consultant* administers the tender process and awards the controls contract in consultation with FMD. The mechanical consultant then issues a price request and subsequent *Change Order* for the controls contract to be applied against the cash allowance. The successful controls contractor acts as a subcontractor to the mechanical contractor.

Aside from the cash allowance carried by the mechanical contractor a separate line item is carried in the project budget to cover FMD’s controls costs. These costs include controls design, controls equipment purchase, controller installation on terminal units, panel installation and terminations, programming, graphics creation and commissioning. The amount carried for this budget line item is determined by FMD’s controls specialist assigned to the Project. Below is a further breakdown of the tasks included in this budget amount:

- Controls Design: is performed by the controls specialists in the controls design group. It is the process of creating the controls tender set. It also involves the selection of controls equipment as required to satisfy the mechanical consultant’s sequences of operation (SOP), and meet University standards.
- Controls Equipment Purchase: The Delta controls equipment and field instrumentation is purchased by FMD to ensure that we are using equipment that has a proven track record and can be serviced by FMD personnel or replaced when necessary with parts that we stock in FMD stores. Equipment purchase is coordinated by the controls specialist.
• Controller Installation: FMD’s controls shop mounts the room controllers, transformers, fuses and damper actuators on the terminal units before the terminal units are installed in the ceiling space by the mechanical contractor. Note: terminal units refer to mixing boxes and air valves.

• Panel Installation and Termination: An FMD electrician mounts the main system controllers in enclosures provided by FMD. The enclosures are typically located in mechanical rooms and are mounted by the controls contractor. Termination of field devices to panel mounted controllers is performed by the FMD electrician as well as installation of all panel mounted equipment. This includes transformers, power supplies, relays, solenoid valves, pressure transmitters, differential pressure switches and current to pneumatic transducers (I/P).

• Programming of the Delta System: is performed by the controls specialist. The programming must satisfy the sequences of operation and conform to the controls standards so that there is consistency from one project to the next.

• Graphics Creation: is the task of creating graphics for the system which provide information and controllability for the central operator and other campus users in a clear and consistent manner. The graphics are created by the controls specialist.

• Commissioning: is the task of testing to ensure that the controls function as specified by the sequences of operation and to the standards specified by the university. Commissioning is performed by the commissioning agent, the controls specialist and the controls shop with assistance from mechanical, electrical and controls contractors as required.

2. Mechanical Contractor’s Scope of Work (from base tender)

As part of the building tender the mechanical contractor is typically responsible for the following: (The mechanical contractor typically sub-contracts this work to a controls contractor)

• Supply and installation of the central mechanical system control valves and steam stations.
• Supply and installation of terminal units
• Rough-in of room thermostats and humidity sensors to above ceiling. Note: This is included in the mechanical tender because if it were included in the separate controls tender block walls may already be in place.
• Installation of room control valves (radiation, reheat and cooling). Supplied by FMD.
• Supply and installation of air flow monitoring stations
• Supply and installation of motorized control and isolation dampers
• Supply and installation of instrument air compressors and filtration along with distribution lines to mechanical rooms
• Assist with integrated system tests

3. Controls Contractor’s Scope of Work

• This scope of work is defined in the controls tender. Note that the controls contractor acts as a sub-contractor to the mechanical contractor.
• Pipe and wire of room thermostats and field devices from room controllers to rough-ins above ceiling.
• Installation and termination of room control devices.
• Termination of room controls devices and communications at room controller.
• Pipe and wire of the controller communication trunk. Contractor must assist the controls specialist to make sure communication wiring is correct.
• Installation of damper actuators (supplied by FMD). Also supply and installation of jackshafting and linkages on fan system dampers.
• Mounting of enclosures for Delta controls equipment (enclosures supplied by FMD).
• Installation of all field instrumentation on building fan systems. (Instrumentation mounted in FMD supplied enclosures is by FMD).
• Tubing and conduit for pneumatic systems for central mechanical systems over and above the basic rough-in included in the base tender.
• Assist with integrated system tests

2.4.6 Building Code Review

The Consultant shall conduct a review of the Project in relation to the National Building Code. A summary of this Code Analysis is to appear on the first sheet of the sets of drawings, and shall also be submitted electronically to the Client Representative as a separate document. It should include NBC (occupancy classifications and fire walls) and CEC (hazardous areas).

2.4.7 Review by Facilities Management Division

Facilities Management Division will review the construction documents as required under the Contract.

The University’s review of drawings and specifications does not defer ultimate responsibility for the design from the Consultant. The Consultant is responsible and accountable for his or her design.

The Consultant will prepare drawing production schedules, including time allocated for Facilities Management Division (FMD) to carry out its review. For major Projects, at least four weeks should be allowed for document review by FMD, before tendering the job. The Consultant should allow two weeks or more for modifications after checking. The Consultant will prepare an itemized summary of action taken by the Consultant Team in response to any review comments.

2.4.8 Review by FMD - Workplace Safety and Environmental Protection (WSEP)

The drawings will be reviewed by the University’s Department of Workplace Safety and Environmental Protection (WSEP) for occupational hazards. Room Requirement Study sheets in Category 02 and Category 03 with a completed Section E will identify the Biological, Chemical and Radio Isotope areas. The Department of Health, Safety and Environment staff will be provided drawings for review from Facilities Management Division at the 50% and 95% stages and will refer designers to appropriate regulations, standards or guidelines for each area as required.
2.4.9 Review by Acoustical Specialist

It is expected that all areas of the building will be provided sufficient acoustical treatment to ensure an adequate acoustic standard throughout the building. In cases where the Consultant requires additional technical advice in this area, he shall request permission from the University to engage an Acoustic Specialist. The Acoustic Specialist will prepare a report and recommendations, which will be forwarded to the Client Representative. The Consultant will incorporate the Acoustic Specialist’s recommendations into the design as advised by the Client Representative.

Attention to acoustic treatment should be directed not only to sound levels in occupied spaces but also to service rooms and to sound power levels at the exterior of buildings as necessary, particularly where loud exhaust fans and equipment operates immediately adjacent to exterior public walks and spaces. In general, any vibrating equipment (mechanical, electrical and other) must be provided with isolation treatment, and any other equipment requiring special acoustic treatment must be properly accommodated.

When selecting sound absorptive materials, strength and clean-ability must be carefully considered. Brittle, friable or potentially hazardous materials shall be avoided. In general, all sound absorptive materials should be kept well above the occupied zone and must be well secured.

2.4.10 University Approvals

Final approval by the University Board of Governors (Board 2) is required before the Project can proceed to tender. The timing of this approval varies depending on the Board of Governors meeting schedule and other project-specific factors. The Consultant should consult with the Client Representative for information on the timing of the approvals process. A “Request for Decision” submission will be prepared and presented to the Board by Facilities Management Division. This submission will normally include drawings, area calculations and a revised cost estimate prepared by the Consultant.

2.4.11 Municipal Review and Approval

Plans for new buildings and major renovations to existing buildings will be submitted to the City of Saskatoon for review, approval and for issuance of building permits. This submission will be made by the Consultant on behalf of the University. A copy of the submission will be sent to Facilities Management Division (FMD). The City of Saskatoon's Building Inspection Department will review working drawings prior to tendering of the Project. All comments from the City review shall be copied to FMD. FMD must approve any changes to design. The Contractor shall obtain the building permit as stipulated by the Contract (General Requirements).

2.4.12 Regulatory Review and Approval

At the completion of the Contract Documentation Phase, the Consultant shall submit evidence of approvals from all regulatory authorities having jurisdiction, such as fire, gas, electrical, and plumbing.
2.5 Bidding and Negotiation Phase

2.5.1 General

During the Bidding and Negotiation Phase, the Contractor is selected and the construction Contract is awarded. The Consultant will assist and advise the University in obtaining bids and negotiated proposals and in awarding and preparing contracts for construction.

2.5.2 Advertising of Tender, Bidding Procedures, Tender Opening

The selection of Contractors for major Projects at the University of Saskatchewan will be by public Tender Call or by invited Tender Call. For details of these procedures, the Consultant shall refer to the document entitled “Procedure for Selecting, Awarding and Issuing Contracts for Minor and Major Construction Projects”, issued by The University of Saskatchewan - Financial Services Division, Purchasing Services. The Consultant must ensure that all criteria for the selection of the Contractor and the award of the Contract are included in the bid documents.

The University will prepare the Notice of Tender and arrange for its publication in newspapers designated by the Client Representative.

Bid documents will normally be distributed by the Consultant, unless otherwise agreed. Copies of the bid documents should be distributed to local Construction Associations, as directed by Facilities Management Division. The Consultant will be responsible for all communication with bidders during the tender period.

Bidding procedures will be stipulated by the University and will be defined in the Invitation to Bid and the Instructions to Bidders.

Tender opening will be conducted by the University as stipulated in the tender documentation.

2.5.3 Addenda

All changes, corrections and clarifications to the tender documents will be issued as addenda, and require the prior approval of the University. Addenda will be issued and distributed by the Consultant. Each addendum shall be numbered consecutively and dated. Addenda originating from Subconsultants shall be issued by the Consultant and integrated into the Consultant’s numbering sequence. No addenda shall be issued later than five working days prior to the tender closing date.

Proposals of equivalents or alternatives are to be encouraged, but must be carefully reviewed to ensure adequate performance of products and systems. When a bidder wishes to propose an equivalent or alternative, he or she shall follow the procedure specified in the Instructions to Bidders. The Consultant is responsible for evaluating requests for equivalents and alternatives and making a recommendation to the Client Representative. All approvals as equivalent or alternatives shall be issued as addenda, and must be approved by the University.

2.5.4 Analysis of Bids and Awarding of Contract

Following the tender opening, the Consultant will perform an analysis of the bids and will submit a written report, including a recommendation to Facilities Management Division (FMD)
for the award of the Contract. This recommendation shall be made as quickly as possible, in order to allow FMD adequate time to obtain the required internal approvals.

The University will be responsible for the issuance of a Letter of Intent, if required, and will notify the unsuccessful bidders.

The Consultant will prepare four (4) executable copies of the Contract Documents and will obtain the Contractor’s signatures. All copies of the Contract Documents are then forwarded to the University of Saskatchewan - Purchasing Services, who obtain the required University signatures. The executed Contract Documents are then distributed by Purchasing Services to the Contractor, Consultant and Facilities Management Division.
2.6 Construction Phase

2.6.1 General

During the Construction Phase, the Contractor is responsible for the execution of the Work described in the Contract Documents. The Consultant is responsible for the administration of the Contract.

2.6.2 Consultant’s Responsibilities

1. General

The Consultant will represent the University to the Contractor. All communication with the University, whether from the Contractors, Subcontractors, Subconsultants or the Consultant’s field personnel, shall be routed through the Consultant. All instructions to the Contractor from the University will be routed through the Consultant. The Consultant’s authority to act on the University’s behalf is defined by the Client-Architect Agreement, the Contract Documents and this Manual.

2. Progress Meetings

At regular intervals throughout construction, generally once monthly, the Consultant will chair Progress Meetings with the Contractor and University representatives, to review progress and consider matters of policy. Minutes of these meetings will be kept by the Consultant and distributed to all concerned within 48 hours of the meeting. Minutes shall indicate actions required and who is responsible for such actions.

3. General Review of the Work

At regular intervals appropriate to the construction schedule, the Consultant will visit the site and conduct a field review of the Work. All Subconsultants are also required to conduct regular field reviews. Such reviews should be timed to allow the Consultant and Subconsultants to review important stages in the progress of the Work, including excavations, concrete reinforcement, concrete forming and framing, structural steel erection, masonry work, waterproofing, cladding, window systems and roofing, floor and wall finishes, cabinetwork and painting. Site Visits should also occur whenever significant new materials or equipment are delivered to site. Site visits should be timed to ensure that key assemblies are reviewed before they are covered up by other construction. During site visits the Consultant will observe the quality of the work, making note of any deficiencies observed, as well as the progress of the Work in relation to the construction schedule. A Field Review Report will be issued to the Client Representative and to the Contractor following each site visit.

4. Supplemental Instructions

The Consultant will render impartial interpretations of the Contract Documents as required. Where clarifications or interpretations of the Contract Documents are required, the Consultant will issue a Supplemental Instruction. Copies of all Supplemental Instructions will be forwarded to the Client Representative.
5. Change Orders and Change Directives

Any change to the Contract Documents requires a Change Order or Change Directive, as described in the Agreement Between Owner and Contractor, whether a price change is involved or not. Contractors must not proceed with work covered by such change procedures until the University has given its approval.

The procedures and conditions governing Change Orders and Change Directives are established in the Contract Documents.

Once monthly, the Consultant will prepare and issue to the University a summary of Change Orders to date.

6. Review of Shop Drawings, Samples and Product Data

The review of shop drawings and product data by the Consultant and Subconsultants is to be coordinated through the Consultant’s office. Reviewed copies of all shop drawings are also to be forwarded to Facilities Management Division (FMD) for review. FMD will provide comments in a timely manner so as to not unduly delay the Project. The Consultant shall maintain a log of shop drawings and other submittals to track the review process and ensure a timely review. Reviewed shop drawings shall be kept on file by the Consultant.

The review of shop drawings by FMD is for the sole purpose of ascertaining appearance and conformance with the general design. The Contractor is solely responsible for all dimensions, quantities and coordination. The review by FMD does not in any way relieve the Contractor from his responsibility of meeting design and performance criteria in all respects.

The Consultant shall also provide the Client Representative with the opportunity to review and approve all product and material samples and mock-ups.

7. Applications and Certificates for Payment

In typical stipulated-sum construction contracts, the Consultant is responsible for evaluating the Contractor’s applications for payment, and issuing Certificates for Payment. Certificates for Payment are based on:

- A schedule of values prepared by the Contractor, and agreed to by the Consultant. The specifications shall contain provision for this document, which should be prepared at the start of construction.
- The Consultant’s determination of the percentage of work complete, based on a field review.
- Statutory holdbacks required by provincial lien legislation.

Note that holdback monies are held as security against claims under the Builders’ Lien Act, and may not be used to enforce the performance of the Contractor or to ensure that deficiencies are corrected. For this reason, the Consultant shall not certify payment for known deficiencies until the performance of the Work is acceptable.

Each progress payment claim shall indicate the Contractor’s Goods and Services Tax registration number, the net amount of the application for payment exclusive of Goods and Services Tax, the amount of Goods and Services Tax applicable and the sum of the two, which shall be considered to be the total claimed for progress payment.
Progress payment claims shall be submitted in conformance with format established by the Consultant. Values of each section of the Work shall be shown with the applicable “New Construction” and “Renovation” costs indicated.

Progress payments shall be dealt with in accordance with the Builders Lien Act, except the requirement for a Holdback Trust Account, which does not apply to the Owner.

Each application for payment after the first payment requested shall be accompanied by a Statutory Declaration, CCDC Document 9A, 9B or 9C, signed by a responsible officer of the Contractor, certifying the actual disbursement of the preceding payment to Subcontractors and for Contractor’s own payroll and materials used on the Project. Please refer to the University’s standard Supplementary Conditions for details. The Consultant shall ensure that the Statutory Declaration has been received and is in good order before each progress payment is certified.

Progress payments will not be processed until acceptable evidence of Contractor supplied insurance and acceptable performance assurance bonds are received in full. The Consultant shall ensure that these submittals have been received and are in good order before progress payments are certified.

Each progress payment claim submitted shall be accompanied with a Workers Compensation Progress Clearance as required by Workers Compensation Board. The Consultant shall ensure that the Workers Compensation Progress Clearance has been received and is in good order before each progress payment is certified.

The Consultant shall refer to the Contract for the terms governing the issuance and withholding of Certificates for Payment.

2.6.3 Invoice Approval

FMD Accounts Payable date stamps the invoice upon receipt. All previous payments and backup documentation are verified and the invoice is then sent out for payment authorization to the Client Representative. If the invoiced amount exceeds the Client Representative signing authority the invoice is co-signed by a director from FMD.

2.6.4 Invoice Payment

Upon receipt of appropriate payment authorization, the approved invoice is entered into FMD’s Computerized Maintenance Management System (CMMS). For invoices involving acquisition of goods, a three-way match is performed by the CMMS system (invoiced amounts are matched with purchase order quantities, receiving quantities and price). If any of these values are outside of defined tolerances, the Purchase Order file is forwarded to a Buyer for investigation. For invoices relating to provision of services, the system will prevent payment if the invoice amount exceeds the contract value (a change order will be required before the invoice can be paid). The system also checks for duplicate payments by ensuring that duplicate invoice numbers do not exist for the particular vendor.

2.6.5 Cost Reporting

When a Project starts to incur expenditures, these are tracked against the budget by account and monitored by the Client Representative on a monthly basis. This helps to ensure that costs charged to the Project are appropriate and to ensure that the Project remains within the overall budget. Some line items may require additional funding throughout the life of the
Project which is managed either by allocation of the contingency or through identification of additional funding. In contrast, some line items may not require their entire budget and any surplus would be allocated to contingency to be applied to any other areas of the Project that require those funds. FMD provides regular cost updates to the Steering Committee outlining the financial situation of the Project. In addition to Steering Committee reviews, FMD and FSD receive a monthly cost summary that outlines the financial situation for every major capital Project and on a quarterly basis the Board also receives summary financial updates on all of the Major Capital Projects.

2.6.6 Payment Terms

Invoice payment data is fed electronically from the CMMS system to the University’s central financial system (UniFi) on a daily basis via voucher feeds. Once posted in UniFi (nightly), FMD receives an automatic email identifying the number of records successfully posted and the number rejected. Any rejections are investigated by the FMD Accounts Payable Coordinator. Cheques are issued by the University’s financial system once a week and mailed directly to vendors.

2.6.7 Independent Testing and Inspection

The requirement for independent testing and inspection services shall be stipulated in the specifications. The Contractor shall be made responsible for coordinating the services of testing and inspection agencies with the construction schedule. The Consultant will receive and review the reports of all independent tests and inspections and will forward such reports to the Client Representative, along with any recommendations for corrective action.

2.6.8 Building Project Signs

Building project signs will be provided by the University and installed by the Contractor.

The following information is typically provided on building project signs:

1. The name of the building.
2. The name of the Consultant and/or Subconsultants.
3. The name of the Contractor.
4. Other information as deemed appropriate by the University (such as funding contributors).

The inclusion of corporate logos is at the discretion of the University, and will normally be restricted to logos representing the Consultant, the General Contractor, and major donors. The University will request digital files of the Consultant’s and General Contractor’s logo for inclusion on the sign.

2.6.9 Obstructions to Traffic

Any work or operation of the Contractor which will interfere with normal University traffic, either vehicular or pedestrian, shall be coordinated through Facilities Management Division before proceeding.
Vehicles associated with the Project will not be permitted to park outside the designated parking area and violations may be ticketed or towed away at the vehicle Owner’s cost. This shall be stipulated in the specifications.

2.6.10 Security and Protection of Property

The University requires special consideration in protecting property and people. The Contractor may have to go to extraordinary measures to provide site security, protect people and protect property, such as fire plans and other emergency procedures. The Consultant shall consult with the Client Representative in preparing suitable provisions for these measures in the specifications.

Precautions shall be taken to prevent damage to roads, sidewalks, landscaping, utilities and services. Evaluation of existing landscape shall occur prior to construction to determine and ensure protection and preservation of any significant planting or habitat, (as determined by Facilities Management Division). Contractors will be responsible for rectifying damage caused by their operations.

2.6.11 Use of Building Equipment During Construction

The General Conditions stipulate that all building equipment shall be new, thus implying that such equipment cannot be used by the Contractor during construction. However, permission to make use of certain equipment may be granted by the University, provided that such equipment is restored to “new” condition upon completion.

2.6.12 Utilities

The Owner will generally provide the Contractor with water, steam or hot water as a heat source, light and power necessary for the performance of the Work, provided demand and consumption are reasonable as determined by the University. These utilities will be provided where available and at one source location only. Natural gas will not be provided by the University unless otherwise agreed. The Contractor shall pay for connection and distribution costs and for restoration to original condition when the connections are removed. These temporary connections are subject to University approval, and the operation of valves and switches in the existing mains must be performed by University personnel only.

Any steam used for temporary heating shall be returned as clean condensate at an acceptable temperature and pressure. (Note: state what temperature & pressure is acceptable.)

2.6.13 Construction Scheduling

The Consultant is expected to enforce the completion clause, as stipulated in the specifications, to the best of his or her ability.

It is expected that construction will proceed regardless of season, according to specification outlines. In consultation with the University, the Consultant shall address any weather-related issues in the specifications. Particular attention shall be paid to requirements in the specifications for cold-weather concrete work.

2.6.14 Key Control
1. Existing Building Keys

The Owner may, as required by the Work, provide keys to the Contractor to allow the Contractor access to the Owner’s property. Any key provided by the Owner shall remain the property of the Owner and shall be returned to the Owner upon request. The Contractor shall pay a deposit of five hundred dollars ($500.00), to the Owner, for each key provided by the Owner. All deposits shall be cash only. The Owner will return deposits to the Contractor within thirty-one (31) days after keys are returned. The Owner will pay no interest to the Contractor for holding of the deposit. Requests for keys shall be made through the Client Representative.

2. Keying Structure

The keying structure will be determined through consultation with the Consultant, the end user and the Facilities Management Division Key Shop.

The installation of cylinders will form part of the construction Contract, and will be carried out by the Contractor. The keying of cylinders will be carried out either by FMD, or by the Contractor (to be determined by FMD during the preparation of Tender Documents). Where the keying of cylinders is to be carried out by the Contractor, FMD will supply a key-bitting list to the Contractor at the time cylinders are installed. FMD will be responsible for cutting keys.

Keying for furnishings, built-in or otherwise, should be independent of room keying.
2.7 Close-Out & Post-Construction

2.7.1 General

At the end of construction, the Contractor is required to submit a number of documents to the Consultant for review. The Consultant is responsible for reviewing these submittals and forwarding them to the Client Representative with recommendations regarding their conformity with the Contract Documents. The required submittals include: permits & certificates of authorization, record drawings, operating & maintenance manuals and copies of all warranties. In addition, the Contractor is normally required to conduct demonstration and training sessions for all equipment and systems, and to submit replacement materials, maintenance products, and special tools as specified.

2.7.2 Substantial Performance of the Work

The Consultant is responsible for determining the date of Substantial Performance of the Work, and issuing a Certificate of Substantial Performance. When the Contractor considers that the Work is substantially performed, he or she applies for a review by the Consultant to establish Substantial Performance of the Work. The Consultant is required to evaluate this application and issue a Certificate of Substantial Performance in accordance with the Builders’ Lien Act and the Contract Documents.

2.7.3 Release of Holdback

After the issuance of the Certificate of Substantial Performance, the Contractor may apply for payment of the holdback amount. The Consultant and Contractor shall refer to the Contract for details of their respective responsibilities.

2.7.4 Permits & Certificates of Authorization

Before accepting the building, the University will require satisfactory written evidence from the Contractor that all regulatory authorities having jurisdiction are satisfied with the construction. Documents to be submitted by the Contractor include the Municipal Occupancy Permit and copies of all permits and certificates of authorization issued by utilities and Authorities Having Jurisdiction.

2.7.5 Record Drawings

An annotated set of ‘as-built’ drawings and specifications showing all changes made during construction are to be submitted by the Contractor to the Consultant. During construction, the Consultant shall ensure that the Contractor keeps such records and provides such information as are necessary to allow for the provision of complete and accurate as-built drawings.

The Consultant is required under the terms of the University’s standard Supplemental Contractual Conditions to maintain electronic “as-built” drawings during the course of construction. Final “as-built” drawings are to be submitted to the Client Representative following Substantial Performance of the Work. Please refer to the ‘Project Archive Requirements’ in the Client-Architect Agreement for details. Final payment to the Consultant will not be made until all as-built drawings are provided. Please refer to the ‘Project Archive Requirements’ in the Client-Architect Agreement for details.
2.7.6 Operating & Maintenance Manuals

Operating and maintenance manuals are required in accordance with the Client-Architect Agreement. The Consultant shall ensure that the Contractor gathers all necessary information for inclusion in the maintenance manuals.

Final payment to the Contractor will not be made until all operating and maintenance manuals are provided.

Manuals shall include:

1. Parts list, including recommended spare parts.
2. Drawings, diagrams and/or exploded view(s).
3. Installation, commissioning, operating and de-commissioning instructions.
4. Trouble-shooting instructions.
5. Name, address, and contact information for all Manufacturers, Suppliers and Installers.
6. Must be in English.
7. Fax copies are not acceptable
8. All available documentation for the equipment is to be included, not simply catalogue pages. For example, documentation on light fixtures should include photometrics.

Please refer to the ‘Project Archive Requirements’ in the Client-Architect Agreement for details.

2.7.7 Shop Drawings

An archive set of shop drawings is required in accordance with the Client-Architect Agreement. Please refer to the ‘Project Archive Requirements’ in the Client-Architect Agreement for details.

2.7.8 Interior Design Finish Binders

An Interior Design Finish Binder is required in accordance with the Client-Architect Agreement. Please refer to the ‘Project Archive Requirements’ in the Client-Architect Agreement for details.

2.7.9 Demonstration & Training

The specifications shall require the Contractor to conduct demonstrations and training to Facilities Management Division staff for all equipment and systems forming part of the Contract. This requirement should be fulfilled before the date of Substantial Performance of the Work.

2.7.10 Warranties & Deficiencies

The University’s standard Supplementary Conditions of the Contract call for a minimum twelve month warranty, dated from Substantial Performance of the Work. No exceptions to this minimum warranty period will be accepted. In addition to the general twelve month coverage, further warranty periods may be required on specific parts. Warranties in excess of one year issued by manufacturers as normal policy, shall also accrue to the benefit of the University, and the University will require copies of such warranties.
Because the process of resolving deficiencies is often a lengthy task, regular joint inspections by the University, Consultant, Subconsultants and Contractor shall continue until all deficiencies are resolved.

Within the warranty period, the University, via the Facilities Management Division, will advise the Consultant of any defect which it believes to be covered by the warranty and only in emergencies will contact the Contractor directly.

2.7.11 Statement of Completion

When the Contractor considers that the Work is complete, he or she applies for an inspection by the Consultant. If the inspection reveals deficiencies, then the Consultant shall issue a deficiency list, and determine the likely cost to complete the deficiencies. A date for the completion of deficiencies will be mutually agreed upon by all parties, and the Consultant conducts another inspection after this date. After all deficiencies have been rectified, the Consultant prepares a Statement of Completion, identifying the date when the Project is deemed to be complete, and a final Certificate for Payment.

2.7.12 Final Certificate for Payment

When all deficiencies have been corrected and the Contract is complete, the Contractor can apply for payment of the final amount. The Consultant is responsible for verifying the validity of the Contractor’s application for final payment and issuing a final Certificate for Payment, according to the terms of the Contract. The certificate should confirm the deemed date of completion as stated in the Statement of Completion. Consultants shall refer to the Builders’ Lien Act of the Province of Saskatchewan and to the terms of the Contract with regard to final payment.

2.7.13 Building Systems Commissioning

- Section Under Development (Review w/ Katherine Theede.)

2.7.14 Warranty Reviews

The University’s standard Supplementary Conditions of the Contract require that a warranty review occur ten (10) months after the written acceptance of the building. This review will take the form of a room-by-room inspection with the Consultant, Subconsultants, Contractor and University representatives in attendance, to note deficiencies. The Consultant will instruct the Contractor to rectify these deficiencies before the end of the warranty period. Immediately before the end of the warranty period, the Consultant, Owner and Contractor shall make a final inspection to assure all deficiencies have been corrected by the Contractor.

2.7.15 Thermography

The University, at its discretion, may engage a testing & inspection agency to carry out a thermographic analysis of the finished building, to confirm that it meets its thermal performance requirements.
3.0 Design Principles

3.1 General
Part 3.0 of the Design Manual sets out seven basic principles or aims which have been established to guide all planning, design and construction Projects at the University of Saskatchewan. These aims are: Beauty, Durability & Sustainability, Heritage Preservation, Economy & Ease of Maintenance, Flexibility, Accessibility and Safety & Security.

3.2 Beauty
Buildings at the University of Saskatchewan should strive to be beautiful. Our campus is recognized as one of the most attractive in Canada, and this has not occurred by chance. The appearance and design of our earliest campus buildings was a subject of particular importance to the University’s founders, and remains an important ideal.

The University of Saskatchewan recognizes the potential of architecture as a form of art. All building Projects should provide the space, materials, furnishings and finishes to meet the requirements of the program, but architecture at the University of Saskatchewan should also strive to achieve more than the satisfaction of functional requirements.

3.3 Durability and Sustainability (Section Under Development)

3.3.1 General
Buildings at the University of Saskatchewan should be durable and designed to be built and operated in an environmentally responsible and sustainable manner. They should aim to maintain ecological integrity, ensure the economic security of the University and provide conditions for social well-being for our staff, faculty and students.

For all building Projects, ‘green’ building standards and practices shall be the standard, with the following general aims for the construction and operation of University facilities:

1. To protect adjacent ecosystems.
2. To reduce and control the rate and quantity of storm water runoff.
3. To encourage active forms of transportation.
4. To minimize the consumption of potable water.
5. To reduce greenhouse gas emissions.
6. To reduce energy consumption.
7. To reduce the quantity of construction waste.
8. To re-use buildings and building materials.
9. To use building materials with more recycled content.
10. To use building materials which are regionally manufactured or extracted.
11. To use building materials which are manufactured from rapidly renewable resources.
12. To use fewer materials.
13. To provide excellent interior air quality.
14. To use low-emitting materials.
15. To provide daylight and views for building occupants.
16. To increase the controllability of interior environments.

It is the practice of Facilities Management Division to achieve LEED® certification for most new buildings and major additions and renovations. The appropriate LEED® rating system and target level of certification (Certified, Silver, Gold, Platinum) shall be determined on a case-by-case basis by the University. For LEED® Projects, LEED® requirements will generally supersede the requirements of this Manual where conflicts occur.

For all other Projects, the sustainability measures outlined in this Manual will constitute the University’s minimum standard, unless otherwise directed by Facilities Management. Projects that are not intended to achieve LEED® certification shall nevertheless meet requirements described below. LEED® to the minimum extent described below.

3.3.2 Sustainable Site Development

1. Erosion & Sedimentation Control
   • Specify temporary erosion, sedimentation and pollution control measures in accordance with the most recent version of LEED® Canada-NC Sustainable Sites Prerequisite 1.

2. Alternative Transportation - Bicycle Storage & Changing Rooms
   • Provide secure bicycle storage, showers and change rooms for 5% of regular building occupants, in accordance with the most recent version of LEED® Canada-NC Sustainable Sites Credit 4.2. Note that central shower facilities exist at the Physical Activity Complex (PAC) Building and the Education Building. Any Project within 500m of these buildings does not require its own dedicated shower facilities. Reference map by Katherine Theede.

3. Reduced Site Disturbance
   • To the extent possible, conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity, restore open space in accordance with the most recent version of LEED® Canada-NC Sustainable Sites Credit 5.1 and reduce the development footprint in accordance with the most recent version of LEED® Canada-NC Sustainable Sites Credit 5.2.
   • Restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation in accordance with LEED® Canada-NC Sustainable Sites Credit 5.1.
   • Designate open space area adjacent to the building that is equal to the development footprint (defined as entire building footprint, access roads and parking) in accordance with LEED® Canada-NC Sustainable Sites Credit 5.2.

4. Stormwater Management
   • Limit disruption and pollution of natural water flows, manage stormwater flows in accordance with the most recent version of LEED® Canada-NC Sustainable Sites Credits 6.1 and 6.2.
3.3.3 Water Efficiency

1. Water Efficient Landscaping
   • Design sites, landscapes & irrigation systems to minimize potable water consumption, in accordance with the most recent version of LEED® Canada-NC Water Efficiency Credit 1.1 (reduce potable water consumption for irrigation by 50% over conventional means).
   • For Consideration: Where feasible, apply Credit 1.2 (Use only captured rain or recycled site water to eliminate all potable water use for site irrigation or do not install permanent landscape irrigation systems. (Review w/ Gift))

2. Water Use Reduction
   • To reduce potable water consumption, design plumbing systems in accordance with the most recent version of LEED® Canada-NC Water Efficiency Credits 3.1 and 3.2 (Reduce potable water consumption in a building by 30%).

3.3.4 Energy & Atmosphere

1. Commissioning
   • FMD has developed in-house commissioning services through the Commissioning Coordinator. Commissioning services equivalent to LEED® Canada-NC Energy & Atmosphere Credit 3 shall be applied to all Projects.

2. Energy Efficiency:
   • All buildings shall be designed to meet or exceed the minimum energy efficiency requirements of the most recent edition of the LEED® Canada-NC Energy & Atmosphere Prerequisite 2 - ‘Minimum Energy Performance’. Compliance shall be demonstrated using whole building energy simulation. Currently, this requires one of the following:
     ▪ For new buildings, a 23% reduction in energy cost relative to a reference building designed to the Model National Energy Code for Buildings 1997 (MNECB).
     ▪ For new buildings, a 10% reduction in energy cost relative to the baseline building performance rating. The baseline building performance rating is calculated according to the building performance rating method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) using a computer simulation model for the whole building Project.
     ▪ For major renovations to existing buildings, a 19% reduction in energy cost relative to a reference building designed to the Model National Energy Code for Buildings 1997 (MNECB).
     ▪ For major renovations to existing buildings, a 5% reduction in energy cost relative to the baseline building performance rating, calculated according to ANSI/ASHRAE/IESNA Standard 90.1-2007.
3. **Metering**

   - Specify separate electrical, gas and water meters for new buildings and for existing buildings subject to major renovations. The Energy and Emission Officer, Office of the Sustainability, Facilities Management Division shall provide the specification for the meter to be installed.

3.3.5 **Materials & Resources**

1. **Storage & Collection of Recyclables**

   - Refer to Part 5, Section 5.22 - Waste and Recycle Collection Points (Category 16)

2. **Building Re-use**

   - Where appropriate and feasible, reusing existing, previously-occupied building structures, envelopes and elements. Remove elements that pose a contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures.

3. **Construction Waste Management**

   - Refer to Part 6, Section F2015 - Construction Waste Management

4. **Resource Re-use**

   - Where appropriate and feasible, incorporation of salvaged, refurbished or reused materials in the building design.

5. **Recycled Content**

   - Specify materials with a minimum 10% recycled content, in accordance with LEED® Canada-NC Materials & Resources Credit 4, unless instructed otherwise. (Minimum recycled content requirements for some products and materials may be higher. Refer to Part 6 - Assemblies & Systems.)

6. **Regional Materials**

   - Specify a minimum of 20% building materials and products extracted, processed, and manufactured within the region, in accordance with LEED® Canada-NC Materials & Resources Credit 5.

7. **Rapidly Renewable Materials**

   - Where appropriate and feasible, incorporate rapidly renewable building materials and products, as defined by LEED® Canada-NC Materials & Resources Credit 6.

8. **Certified Wood**

   - Specify a minimum of 50% (based on cost) of wood-based materials and products that are certified in accordance with the Forest Stewardship Council’s (FSC) Principles and
Criteria, for wood building components, in accordance with LEED® Canada-NC Materials & Resources Credit 7.

3.3.6 Indoor Environmental Quality

1. Outdoor Air Delivery Monitoring (CO₂ Monitoring)
   - Where appropriate, design ventilation systems to include permanent carbon dioxide (CO₂) monitoring systems to ensure that ventilation systems maintain design minimum requirements, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 1. HVAC systems serving spaces likely to experience high CO₂ levels should be designed to ensure that other spaces are separately controlled.

2. Low-Emitting Materials
   - Specify low-VOC adhesives & sealants, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.1.
   - Specify low-VOC paints and coatings, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.2.
   - Specify flooring products and materials in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.3.
   - Specify wood, agrifibre products and laminating adhesives that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.

3. Indoor Chemical and Pollutant Source Control
   - Design to minimize and control the entry of pollutants into buildings and later cross-contamination of regularly occupied areas, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 5.

4. Controllability of Systems: Lighting Controls
   - Review LEED® Canada-NC Indoor Environmental Quality Credit 6.1 with FMD Electrical.

5. Thermal Comfort
   - Review LEED® Canada-NC Indoor Environmental Quality Credit 6.2 with FMD Mechanical.
   - Review LEED® Canada-NC Indoor Environmental Quality Credit 7 with FMD Mechanical.

6. Daylight & Views
   - Where feasible maximize interior daylighting and views in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 8.
   - Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, lower partitions,
high-performance glazing, and high-ceiling reflectance values; additionally, automatic photocell-based controls can help reduce energy use. Predict daylight factors via manual calculations, or model daylighting strategies with a physical or computer model to assess lighting levels and daylight factors achieved.

3.3.7 Durability

1. Buildings at the University of Saskatchewan should be durable. In general, the design life of the building structure shall be 100 years. The shell, structure and exterior envelope of a building shall have a design life of 100 years. Interior finishes, electrical components and mechanical systems should be specified with a 50-year life-span in mind, although it is recognized that many such products and systems are not available with expected life-spans of 50 years duration.
### 3.4 Heritage Preservation

Buildings and sites of historical or heritage importance at the University of Saskatchewan should be treated in accordance with recognized principles of architectural heritage preservation. A *University of Saskatchewan Heritage Register* has been created to ensure good architectural heritage conservation practice at the university. The *Heritage Register* includes an assessment of a property's heritage value according to its character-defining elements. This *Register* defines two categories of heritage designation for University of Saskatchewan heritage assets: ‘A’ and ‘B’. Any intervention involving an ‘A’ listed heritage asset is required to be carried out in accordance with the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada, 2003), wherever reasonably practicable as determined by Facilities Management Division. Any intervention involving a ‘B’ listed heritage asset is recommended to be carried out in accordance with the *Standards and Guidelines*. The *Standards and Guidelines* document is available for download here:


In either case, the determination of whether the intervention involves preservation, rehabilitation or restoration shall be determined on a case-by-case basis, in accordance with the proposed functional program and budget, by Facilities Management Division, in consultation with the architect and consultant team. Buildings and sites that have been assessed, but that are not considered to have sufficient heritage value to be formally listed are identified in the Register as ‘N/A.’ However, where appropriate, the information on these buildings and sites contained in the Register will be considered whenever interventions are proposed.

In the cases of Affiliated and Federated Colleges, the conclusions of the Heritage Register constitute a recommendation to those colleges. The buildings and sites included in the *Heritage Register*, and their designations, are as follows:

**Heritage Buildings in Chronological Order:**

- 1887 Little Stone School (039) — ‘A’ Listed
- 1913 Peter Mackinnon Building (054) — ‘A’ Listed
- 1911 College of Emmanuel and St. Chad (935) — ‘A’ Listed
- 1912 Engineering Building (001) — ‘B’ Listed
- 1913 University Club (041) — ‘B’ Listed
- 1912 Stone Barn (337) — ‘A’ Listed
- 1912 Saskatchewan Hall (006) — ‘A’ Listed
- 1913 President’s Residence (021) — ‘A’ Listed
- 1911 Rugby Chapel (933) — ‘A’ Listed
- 1915 Seed Barn (076) — ‘A’ Listed
- 1924 Horticulture Building (005) — ‘B’ Listed
- 1916 Qu’Appelle Hall (008) — ‘A’ Listed
- 1919 Poultry Science Building (027) — ‘B’ Listed
- 1921 Physics Building (009) — ‘A’ Listed
- 1923 St. Andrew’s College (932) - Affiliated College — ‘A’ Listing Recommended
- 1924 Thorvaldson Building (013) — ‘A’ Listed
- 1929 Archaeology Building (003) — ‘A’ Listed
- 1930 Observatory (025) — ‘A’ Listed
- 1931 Williams Building (035) — ‘B’ Listed
- 1935 Ernest Lindner Studio — ‘B’ Listed
- 1936 ‘Gus’ Kenderdine Studio — ‘B’ Listed
- 1949 Kirk Hall (031) — ‘B’ Listed
- 1949 John Mitchell Building (064) — N/A
- 1950 Health Sciences Building (049) — ‘B’ Listed
1955 Memorial Union Building (051) ................................................................. ‘B’ Listed
1951 Feed Elevator (346) .................................................................................. ‘B’ Listed
1956 Murray Building (053) ................................................................................ ‘B’ Listed
1956 St. ThomasMoreCollege(934)-FederatedCollege ................................ ‘B’ Listing Recommended
1967 Arts Complex (061) .................................................................................. N/A
1966 Emmanuel and St. Chad Chapel (936) ......................................................... ‘B’ Listed
1967 Commerce (ESB) (060) .............................................................................. N/A
1967 Law Building (062) .................................................................................. ‘A’ Listed
1968 Lutheran Seminary (938-940) - Affiliated College ...................... ‘A’ Listing Recommended
1979 Dental Clinic (048) .................................................................................. ‘B’ Listed
1987 Administration Building (007) ................................................................. N/A

Heritage Sites in Chronological Order
Devil’s Dip ........................................................................................................ N/A
1923 The Bowl .................................................................................................. ‘A’ Listed
1916 Voyageur Place ........................................................................................ ‘B’ Listed
1928 Memorial Gates (644) ............................................................................. ‘A’ Listed
ca.1965 Palliser Garden .................................................................................. ‘B’ Listed
1979 Diefenbaker’s Gravesite (647) ............................................................... ‘A’ Listed

Consultants working on buildings or sites included in the Heritage Register may obtain a copy by contacting:

Andrew Wallace
Associate Director, Space Management & Planning
306 966 6106
andrew.wallace@usask.ca

3.5 Economy & Ease of Maintenance

Buildings at the University of Saskatchewan should be designed to be built and operated in an efficient and cost-effective manner. Considerations of economy should include both initial and life-cycle costs.

The maintenance and repair of the physical plant of a University is costly and time-consuming. Ease of maintenance should therefore be considered in all design decisions, in order to minimize the costs of upkeep.

3.6 Flexibility

New buildings and additions to existing buildings at the University of Saskatchewan should be designed for future flexibility. In modern academic and research institutions, renovation and alteration occur frequently. Buildings should be designed to allow for as much ease in future renovation as possible. Additions and alterations should be designed to be constructed without major disruption to existing building functions and existing major service systems, isolating disturbances only to local facilities and services. The campus is also continually growing. Design should make allowance for added growth in all respects.

3.7 Accessibility
Buildings at the University of Saskatchewan shall be universally accessible and safely usable by persons with physical, sensory and cognitive disabilities. New construction shall conform to the most recent edition of the following codes and standards:

- CAN/CSA B651 Accessible Design for the Built Environment
- National Building Code of Canada
- Uniform Building and Accessibility Standards Regulations - Saskatchewan

Note that the requirements of CAN/CSA B651 exceed those of the National Building Code. Where discrepancies of detail occur, the standard which is most advantageous to persons with disabilities shall govern.
3.8 Safety and Security

3.10.1 General
Buildings at the University of Saskatchewan should be designed to be built and operated safely. Considerations of safety should include:

- Personal safety for members of the university community.
- Occupational safety, including protection from hazardous substances, workplace ergonomics, injury prevention, indoor air quality, noise control & thermal conditions. *Consultants* shall ensure that University buildings comply with the Saskatchewan Occupational Health and Safety Act and Regulations.
- Laboratory safety: laboratory design requires special consideration of chemical, radioactive and biological hazards. For detailed requirements, refer to Part 5, Section 5.3 - Instructional & Research Laboratory Spaces (Categories 02 & 03).
- Building security, including security from theft and security from vandalism.
- Construction site safety & security.

3.10.2 Crime Prevention Through Environmental Design (CPTED)

*(Section Under Development - Review w/ Protective Services)*

1. General
CPTED (Crime Prevention Through Environmental Design) principles should be employed in the design of all University buildings and grounds.

CPTED strategies are based on the premise that the design of the built environment can reduce crime and reduce the fear of crime. CPTED principles seek to dissuade offenders from committing crimes by manipulating the built environment in which those crimes occur. The three most common CPTED built environment strategies are:

- Natural surveillance
- Natural access control
- Natural territorial reinforcement

Natural surveillance and access control strategies limit the opportunity for crime. Territorial reinforcement promotes social control through a variety of measures. These strategies are described briefly below, with examples.

2. Natural Surveillance
Natural surveillance increases the threat of apprehension by taking steps to increase the perception that people can be seen. Natural surveillance occurs by designing the placement of physical features, activities and people in such a way as to maximize visibility and foster positive social interaction among legitimate users of public space. Potential offenders feel increased scrutiny and limitations on their escape routes.

- Design streets and walks to increase pedestrian and bicycle traffic.
- Place windows overlooking walks and parking lots.
- Use passing vehicular traffic to create passive surveillance of buildings & grounds.
• Design landscapes to provide passive surveillance, especially near points of entry.
• Maximize the use of clear glazing at building entrances, to provide passive surveillance.
• Design lighting to provide continuous coverage along a path. Ensure potential problem areas are well-lit: pathways, stairs, building entrances & exits, parking areas, bus stops, children's play areas, storage areas, dumpster and recycling areas, etc.
• Design lighting to avoid glare or deep shadows, which may hinder the view for potential observers. Eyes adapt to night lighting and have trouble adjusting to severe lighting disparities. Using lower intensity lights often requires more fixtures.
• Place lighting along pathways and other pedestrian-use areas at proper heights for lighting the faces of the people in the space (and to identify the faces of potential attackers).

Natural surveillance measures can be complemented by mechanical and organizational measures. For example, closed-circuit television (CCTV) cameras can be added in areas where window surveillance is unavailable.

3. Natural Access Control

Natural access control limits the opportunity for crime by taking steps to clearly differentiate between public space and private space. By selectively placing entrances and exits, lighting and landscape to limit access or control flow, natural access control occurs.

• Clearly identify points of entry.
• Design entry sequences to direct people towards reception areas.
• Washrooms, change rooms & shower rooms should be designed “airport-style”, without doors. Where doors are used, they should not be fitted with locks. These measures avoid the isolation that is produced by a double door entry system.
• Design to prevent unauthorised access to roofs.

Natural access control is used to complement mechanical and operational access control measures, such as target hardening.

4. Natural Territorial Reinforcement

Territorial reinforcement promotes social control through increased definition of public, semi-public and private space, and an increased sense of ownership. An environment designed to clearly delineate private space creates a sense of ownership. Owners have a vested interest and are more likely to challenge intruders or report them to the campus security. Further, the sense of owned space creates an environment where illegitimate users stand out and are more easily identified. By using buildings, pavement, signs, lighting and landscape to express ownership and define public, semi-public and private space, natural territorial reinforcement occurs.

• Provide trees in landscape designs. Research results indicate that outdoor spaces with trees are seen as significantly more attractive, safer, and more likely to be used than similar spaces without trees.
• Placing amenities such as seating or refreshments in common areas helps to attract larger numbers of desired users.
• Designing common areas for specific activities increases proper use, attracts more people and increases the perception that these areas are controlled.
Territorial reinforcement measures make the normal user feel safe and make the potential offender aware of a substantial risk of apprehension or scrutiny.
4.0 Overall Building Design

4.1 General

Part 4.0 of the Design Manual describes overall building design requirements, including building siting, University planning considerations, municipal planning requirements, building height limitations and building massing.

4.2 Building Siting

The choice of building site and the basic arrangement of the building on its site will normally be carried out by Facilities Management Division. The basic principles governing the siting of buildings are contained within the Core Area Master Plan, University of Saskatchewan (2003), which is available on line at:

http://facilities.usask.ca/masterplan/master_plan_final.pdf

Normally, the Program of Requirements will include a site plan prepared by Facilities Management Division. This site plan is preliminary, and is intended to indicate the general location of the building on its site. The Consultant, in actually fitting the building to the site, should be familiar with the general campus planning policies which follow.

University buildings are located on areas of land arbitrarily defined and called “building sites”. Other agencies on campus, whether governmental or religious, are allocated areas defined by a lease. No physical emphasis of this line is permitted in the landscaping of areas, with the possible exception of fences for certain sites requiring security. The University has in the past modified the extent and alignment of leases to suit desired expansion of the Campus, and could in the future continue this practice if necessary.

4.2.1 General Planning Considerations - Meewasin Valley Authority

The entire campus of the University of Saskatchewan falls within the ‘Conservation Zone’ of the Meewasin Valley Authority (MVA), as defined by The Meewasin Valley Authority Act. The Consultant shall refer to the Development Policy of the Meewasin Valley Authority for a list of MVA policies and guidelines applicable to development within the Conservation Zone. A portion of the University of Saskatchewan campus is subject to the MVA Development Permit process. Refer to 2.3.9 Municipal Approvals above.

4.2.2 General Planning Considerations - City of Saskatoon Zoning Bylaw

The campus of the University of Saskatchewan is subject to the City of Saskatoon Zoning Bylaw No. 7800. This document is available on the City of Saskatoon website at:


The Zoning Bylaw defines permitted uses, prohibited uses, discretionary uses, setbacks, maximum building height, signage and parking. Most of the University campus falls within the Agricultural Zoning District (AG); however, the College Quarter falls within Direct Control District 7 (DCD7).

4.2.3 General Planning Considerations - Core Area Master Plan

The Core Area Master Plan, University of Saskatchewan (2003) is the primary document defining the parameters within which the University intends to develop its campus.
Consultants are directed to refer to this document for a more complete description of the planning considerations to be followed in the siting of buildings.

The Core Area Master Plan divides the campus into eleven ‘precincts’, relating to the historic pattern of development on the U of S campus, in which similar and complementary functions have tended to be clustered together geographically. The precincts defined by the Master Plan, and some of their general characteristics and planning considerations are as follows:

1. Core Campus South:

This precinct forms the historical and academic core of the campus, which developed during its early years according to the 1909 Campus Plan by Brown & Vallance Architects. The 1909 Campus Plan was a formal design in the European Beaux-Arts tradition. It was characterized by a series of grand axial boulevards and landscaped gardens, with grouped arrangements of buildings forming smaller quadrangles or courtyards. One of the primary axes of the 1909 plan was inscribed perpendicular to the riverbank, and incorporated the large oval courtyard now known as the “Bowl”. The actual development of the campus in the period between 1909 and 1929 focused around the Bowl such that it now forms the heart of the campus. Although the Brown & Vallance plan was abandoned during the 1950’s, development has tended to occur as a series of concentric rings emanating from the Bowl. The Bowl marks the approximate centre of the Core Campus South, which encompasses the area bounded by Campus Drive to the north and east, Wiggins Road to the west and College Drive to the south.

The Core Campus South is the most densely developed part of campus. Further densification is expected, because buildings within this precinct are roughly contained within the ten-minute walking distance corresponding to the break between classes. A concentration of academic buildings has also developed within this precinct for the same reason. The Core Campus South has been developed primarily as a pedestrian area, and will retain this focus.

The Core Campus South contains a residence area, called Voyageur Place, which includes Qu’Appelle Hall, Saskatchewan Hall, Athabasca Hall and Marquis Hall. It also contains a theological college, St. Thomas Moore. The facilities of the College of Emmanuel and St. Chad, formerly a theological college and chapel, have been sold to the University and their future use is currently under review.

2. Core Campus North:

This area is situated immediately north of the Core Campus South and Campus Drive. It currently contains a diverse mixture of academic buildings, research facilities, administrative offices and campus infrastructure. It has been identified in the Master Plan as a potential area for future development, and potentially a significant new focus for the campus. The Master Plan recommends that this precinct should be developed with a similar scale and pedestrian focus as the Core Campus South. It proposes a second major formal green space, similar in scale and function to the Bowl, as a visual and symbolic centre of the Core Campus North.

3. Health Sciences Precinct:

The Health Sciences Precinct is situated in the south-west corner of the campus, in the area defined by College Drive to the south, Wiggins Road to the east, and Campus Drive to the north. It is centered around the cluster of medical and medical research facilities that have grown up around the Royal University Hospital, but also contains the Little Stone School, the President’s Residence, St. Andrew’s College and Memorial Gates.

The Health Sciences Precinct presents several difficult planning constraints. It is one of the most prominent and heavily used areas of campus, representing the public face of the University to those traveling across the University Bridge from downtown Saskatoon, or along
Clarence Avenue from the south. It is also the most constrained campus precinct in terms of land available for expansion. Its relationship to the riverbank is particularly strained, with the RUH Parkade presenting a utilitarian face to the city across the river. In addition to any requirements for the expansion of buildings in this area, the future development of this precinct should consider the following key planning aims:

- The south-west corner of the site, including the lands north of College Drive and south of the President’s residence, have been identified by the Master Plan as a natural site for a formal gateway to the campus.
- The ecological protection of the riverbank.
- The public face of the University as it is seen from across the river.
- The protection and enhancement of existing campus green spaces.
- The protection of the historically significant Memorial Gates, and the enhancement of the historical axis on which the Gates are aligned.

The Health Sciences Precinct should be developed with a pedestrian focus, except where access by emergency vehicles is required.

4. River Valley Precinct:

The Master Plan defines a River Bank Precinct encompassing a strip of land facing the South Saskatchewan River, extending from the University Bridge in the south to the Canadian Pacific railway line at the northern edge of the campus. It encompasses land under the jurisdiction of both the Meewasin Valley Authority and the University. It is intended primarily as a publicly accessible amenity, which preserves the natural setting of the riverbank. The Meewasin Valley Trail system traverses this precinct.

Only three buildings currently exist within the River Valley Precinct: the Diefenbaker Canada Centre, the Lutheran Theological Seminary and Ogle Hall.

Development activity within this precinct is expected to be very limited, with a priority placed on the preservation of the river valley as a natural setting and as an amenity for the enjoyment of the public. An emphasis on pedestrian access and the preservation of the natural setting is required in this precinct.

The River Valley Precinct is governed by The City of Saskatoon Development Plan (Bylaw No. 7799), which defines a “Riverbank Area” as follows:

“land within the corporate limits of the City of Saskatoon being within ninety-two (92) metres of the shoreline of the South Saskatchewan River or on any part of the slope leading down to said shoreline where the gradient is in excess of twenty (20) percent, plus 10 metres, whichever extends the greatest distance measured horizontally from the shoreline.”

Development within the “Riverbank Area” is limited to amenities intended for the enhancement of the riverbank as an Environmental Reserve and a public recreation area. Consultants shall refer to the City of Saskatoon Development Plan for details.

In addition, the Prairie Farm Rehabilitation Administration (P.F.R.A.) has recommended that buildings be set back from the river bank a minimum distance relative to the height of site from water level by a ratio of 7 to 1.

5. Farmstead Precincts North & South:
Two farmstead sites form part of the U of S campus: the Farmstead South, situated between Campus Drive and Preston Avenue, immediately north of College Drive, and the Farmstead North, situated on the east side of Preston Street at 108th Street. The Farmstead South precinct marks the University's south-east gateway, both in terms of its prominent location and as a symbol of the University’s origin and continued function as an agricultural college. The Master Plan recommends that the form and function of the Farmstead precincts should be maintained and enhanced. Consultants shall also refer to the Farmstead Master Plan Review (April 1996) for further information and guidance.

The Farmstead South has particular heritage significance to the University, and the Stone Barn and Grain Elevator are both significant heritage structures. The protection and enhancement of the Farmstead as a heritage asset is one of the key themes of the Farmstead Master Plan, and should be a primary consideration is any development within this precinct.

6. Research South Precinct:
Research South Precinct is a mixed-use area situated west of Preston Avenue, between Innovation Place and the Farmstead South. It currently houses an assortment of functions, including animal paddocks, storage yards, an electrical substation, parking lots and various research facilities. The ad-hoc nature of the existing land-use in this area presents a challenge with respect to planning its future development, because Preston Avenue is projected by the Master Plan to become an increasingly important gateway to the campus.

7. Innovation Place Precinct:
Innovation Place is a commercial research park operated by the Government of Saskatchewan on land leased from the University of Saskatchewan. Innovation Place is responsible for its own planning and development, and is therefore not addressed in this document.

8. Research North Precinct:
The Research North Precinct is a largely undeveloped area of land west of Innovation Place and north of Seminary Crescent. The Master Plan has recommended that this land be reserved for future research park expansion.

9. Athletic Precinct:
The Athletic Precinct is located south of College Drive and east of Cumberland Avenue. It contains Griffiths Stadium, the Teamhouse, the Saskatoon Fieldhouse (leased to the City of Saskatoon), the Crop Sciences Seed Barn and the Stadium Parkade. Several outdoor playing fields exist in this area. A covered walkway connects the Stadium Parkade with the Kinesiology/Physical Education Complex across College Drive. The Athletic Precinct forms part of the College Quarter, and is subject to planning guidelines and architectural performance standards contained within the College Quarter Master Plan (Brook McIlroy Planning + Urban Design, 2010.)

10. McEown Park:
McEown Park is a cluster of student residence buildings located off Cumberland Avenue, south of the Athletic Precinct. It also encompasses the Williams Building, a former school for the deaf which is now a multi-purpose building containing various academic and administrative functions, as well as a daycare centre. McEown Park forms part of the College Quarter, and is subject to planning guidelines and architectural performance standards contained within the
4.2.4 College Quarter Master Plan

The College Quarter Master Plan is a set of planning guidelines and architectural performance standards prepared by Brook McIlroy Planning + Urban Design, and approved by the University Board of Governors in 2010. It governs the area of campus bounded by College Drive to the north, 14th Street East to the south, Preston Avenue to the east and Cumberland Avenue to the west. The College Quarter is also subject to the City of Saskatoon Zoning Bylaw, Direct Control District 7 (DCD7). For a copy of the College Quarter Master Plan, please refer to: [http://www.usask.ca/collegequarter/](http://www.usask.ca/collegequarter/).

4.2.5 Other University Planning Considerations

It should be noted that some restrictions may exist with respect to proximity to the Canadian Light Source Synchrotron Facility and to the SED Systems’ satellite dish.

4.3 Relationship to Physical & Historical Context

The University of Saskatchewan has inherited a coherent and significant collection of historical buildings, the oldest of which were constructed between 1910 and 1912. Until around 1950, the University of Saskatchewan was developed with a consistent use of the Collegiate Gothic architectural style. These early buildings are also characterized by the predominant use of a local fieldstone known as “Greystone” as the principal material for exterior walls. Cut Indiana Limestone, and later Manitoba Tyndalstone, were the materials of choice for window surrounds and carved detailing. Since 1950, buildings have been constructed in a number of different architectural styles, but the use of Greystone, Indiana Limestone and Tyndalstone has remained relatively consistent. Moreover, with the exception of the Arts Tower and the Agriculture Building, a general consistency of building height has been maintained in the Core Campus. The result has been a campus that very successfully blends a diversity of architectural expression with a pleasing consistency of material, texture, colour and scale.

New buildings at the University of Saskatchewan should strive to continue this successful approach to reconciling contemporary architecture with its physical and historical context. New buildings should relate to and complement existing buildings in terms of scale and architectural character, but need not replicate them in terms of style or period detailing.

4.4 Building Height & Massing

**Section Under Development**

It is intended that within the individual campus precincts, buildings should generally maintain a horizontal continuity of form, in order that the campus develops as an integrated design. Buildings should therefore generally conform to the following height restrictions:

1. Core Campus South: 3-4 stories. In this precinct, care should be taken to relate new buildings to existing ones in terms of scale and massing.

2. Core Campus North: 4 stories. This precinct is intended to be developed in form and
scale as a continuation of the Core Campus South.

3. Health Sciences Precinct: to be determined.

4. River Valley Precinct: to be determined.

5. Farmstead Precincts North & South: to be determined.

6. Research South Precinct: to be determined.

7. Innovation Place Precinct: to be determined.

8. Research North Precinct: to be determined.


10. McEown Park: Refer to College Quarter Master Plan (Brook McIlroy Planning + Urban Design, 2010.) http://www.usask.ca/collegequarter/
5.0 Functional Spaces

5.1 General

5.1.1 Scope

Part 5.0 of the Design Manual specifies the requirements to be met in designing rooms and spaces within the Building, based on the function of the proposed space. The information contained in this Part has been organized roughly according to the Council of Ontario Universities’ (COU) space classification system, Building Blocks. The COU system classifies building space according to 20 major use categories, described as Category 1, 2, 3, etc... Program areas are normally determined by Facilities Management Division, according to the University’s Space Allocation Standards, listed in Appendix B.

5.1.2 Functional Space Categories

This Manual employs COU categories as follows:

- **Category 01**: Classroom Facilities.
- **Category 02/03**: Instructional & Research Laboratory Spaces
- **Category 04/10**: Academic Offices & Administrative Offices, including enclosed offices, open office areas, & meeting rooms.
- **Category 05**: Library Facilities
- **Category 06**: Athletic and Recreational Space.
- **Category 07**: Food Service Space
- **(Category 08)**: Bookstore & Merchandising Facilities - Category Not Used
- **(Category 09)**: Maintenance & Facilities Management Space - Category Not Used
- **(Category 11)**: Audio-Visual Service Space - Category Not Used
- **(Category 12)**: Central Service Space - Category Not Used
- **(Category 13)**: Student Health Services - Category Not Used
- **Category 14**: Common Use Space and Student Activity Space
- **Category 15**: Assembly and Exhibition Facilities
- **Category 16**: Non-Assignable Areas, including Main Public Entrances & Lobbies, Secondary Public Entrances, Service Entrances, Materials Transfer Rooms, Circulation, Stairs & Stairwells, Elevators, Washrooms, Emergency Showers & Eye Washes, Photocopier/Printer Stations, Waste and Recycle Collection Points, Mechanical & Electrical Rooms, Communications Closets, Custodial Lounges, Custodial Supply Rooms, Custodial Closets)
- **Category 17**: Residential Space
- **Category 18**: Animal Space
- **Category 19**: Other University Facilities, including Parking Structures.
- **(Category 20)**: Health Science Clinical Facilities - Category Not Used
Note: Space standards are provided for common room types. In instances where the requirements for a particular room or space are not listed, or are listed as ‘Under Development’ a standard will be developed by FMD’s Architectural Design Coordinator, in consultation with the Consultant and the Project Client Representative.
5.2 Classroom Facilities (Category 01)

5.2.1 General
1. ‘Classroom Facilities’ refer to rooms used for regularly scheduled instruction which do not require special purpose equipment for student use. Included in this category are lecture rooms or theatres, tutorial rooms, seminar rooms and classrooms.

5.2.2 Location, Design & Dimensions
1. Lecture theatres and large classrooms should be located on the ground floor where possible, close to main building entrances, for ease of access and egress by large groups of people. Comply with code requirements for exiting.
2. Provide ample circulation space and crush space outside of classrooms & lecture theatres.
3. Do not locate classroom facilities adjacent to or below other spaces that produce excessive noise, such as mechanical rooms, gymnasium, performance spaces, music rooms, assembly spaces, lunch rooms, etc...
4. Room shape shall be designed to:
   • Optimize viewing angles between seating and the instructor, projection screen and whiteboard(s).
   • Provide good acoustics for both voice and amplified sound.
   • Achieve proximity of students to the instructor.
5. For smaller classroom facilities, provide a near-square plan, slightly longer than wide.
6. For larger classroom facilities (over 80 capacity), provide a fan-shaped room. Fan-shaped instructional spaces provide better acoustics and sightlines. For capacities over 100, consider a raked floor.
7. For classroom facilities equipped with projection equipment, ensure the first row of seats is positioned back from the screen by a distance equal to twice the screen height. The last row of seats should be positioned no further back than eight (8) times the screen height. In rectangular rooms, locate the projection screen on a narrow wall.
8. For lecture theatres, a projection booth or control booth may be required. Confirm this requirement with Client Representative. For control & projection booths provide the following:
   • Two doors; one leading to the instructional space, another to the corridor outside.
   • A glazed projection window, with double glazing for sound isolation. (Do not specify portholes).
   • Acoustic isolation between booth and instructional space to STC 50, including full perimeter seal around doors.
   • Dimmable lighting to booth.
   • Room lighting controls, retractable screen controls.
9. For raked floors, ramped aisles are preferred over stepped aisles.
10. Aisles should be located to minimize disruption by late arrivals. Side aisles are preferred over centre aisles, because the best locations for viewing are located in the centre of the room.

11. Provide wheelchair accessible spaces in all classrooms and lecture theatres to National Building Code requirements. Provide a variety of locations, not just at the front and back of the room.

### 5.2.3 Flooring Materials & Finishes

2. Consider the movement of equipment carts, in the selection of flooring materials and transitions.

### 5.2.4 Wall Materials & Finishes

1. Acceptable wall finishes: painted gypsum wall board, concrete, concrete block, brick, hardwood-veneer panels. Paint finishes shall be off-white, colour selections to be approved by FMD Interior Design Department. The requirement for an off-white colour scheme exists because different colors absorb and reflect florescent and natural light differently. In cases where people have Scotopic Sensitivity Syndrome, the reflection off colored walls can be bothersome as it can create a flashing light effect.
2. Walls shall be constructed to underside of structure, to isolate sound. Seal junction between wall and structural deck or slab. Seal all penetrations.
3. Ensure that classroom facilities are acoustically isolated from adjacent spaces, and are designed to provide adequate acoustic absorption.
4. Operable partitions between classrooms are discouraged, because they do not provide adequate acoustic separation.

### 5.2.5 Ceiling Materials & Finishes

1. In classrooms, tutorial rooms & seminar rooms, specify suspended acoustic ceiling tile. Consider also the use of partial drywall bulkheads and valences, to avoid monotonous design.
2. In lecture theatres, the intention is to provide scope for a wide variety of options in ceiling finishes. These may include, but are not limited to: acoustic tile, wood tile, metal tile, gypsum wall board, linear wood, and acoustical panels of various types. In the design of the ceiling, give full consideration to the acoustical requirements of the space and the acoustical properties of the materials employed.

### 5.2.6 Doors & Windows

1. Specify doors with a minimum clear opening dimension of 910mm. For larger rooms, double doors are preferred, each leaf minimum 910mm.
2. Specify a narrow side lite or a view lite in the door itself.
3. Avoid threshold strips or level changes at doorways, as they impede equipment carts & wheelchairs.
4. For larger classroom facilities, doors should be located at the rear of the room or at both the front and rear.
5. Do not position doors in common walls between classrooms.
6. Windows are not required in lecture theatres. Windows may be considered for other classroom facilities, but should be fitted with power-activated black-out blinds.

5.2.7 Acoustic
1. Design classrooms to be acoustically isolated from adjacent spaces. Ensure the following minimum Sound Transmission Class (STC) ratings:
   - STC 50 between classrooms
   - STC 50 between classrooms and laboratories
   - STC 45 between classrooms and corridors
2. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.60 - 0.70.
3. For larger classrooms, consider additional acoustic treatment on walls.
4. For lecture theatres, use a qualified acoustical consultant to ensure adequate acoustical properties.

5.2.8 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Design systems to maintain space temperature between 21 ºC and 23 ºC, maximum 60% RH, year round. Buildings and systems shall be designed to eliminate asymmetrical thermal radiation, drafts, vertically stratified temperature differences and overly warm or cold floors. Refer to ASHRAE Handbook of Fundamentals, “Thermal Comfort” section.
3. Design ventilation systems to deliver a minimum of 8 l/s outdoor air per person. Design distribution system to ensure even ventilation throughout the space and minimum stratification and short-circuiting between supply and return/exhaust openings.
4. Provide a separate thermostat for each instructional space.
5. Use low-velocity, high volume ducting to ensure low noise levels from mechanical ventilation.
6. Add information.

5.2.9 Plumbing
1. Demonstration benches may require water, gas & compressed air. Confirm requirement with Client Representative.

5.2.10 Electrical
1. Design evenly distributed illumination to the level specified in Part 6, Section D50 - Electrical. The lecturer and the surface of the lectern should remain illuminated at all times in theatres.
2. Lighting should be zoned and switched to provide light levels suitable for multimedia/projection. General lighting shall be provided with fluorescent lamps.
3. Switches controlling general illumination should be located by each door, at the lectern and in the control booth where one is provided. Facilities with multimedia consoles may utilize low voltage controls and dimming ballasts depending on the flexibility required. All other facilities may be controlled by occupancy sensors.

4. Specify aisle lighting where stepped aisles are provided.

5. All classroom facilities with steps should have emergency lighting regardless of size. Provide emergency lighting in all other facilities as required by the NBC. Emergency lighting should be switched but provided with a relay to come on in the event of a power failure.

6. Consideration shall be given for the provision of additional electrical outlets to accommodate laptop use. Confirm requirements with FMD through Client Representative.

7. Whiteboards & chalkboards should be well and evenly illuminated, without hot spots or glare.

8. Coordinate electrical requirements for the media console (wired lectern).

9. Refer also to Part 6, Section D50 - Electrical.

5.2.11 Communications & Media

1. The University’s Educational Media Access and Production (EMAP) unit provides a consulting service recommending applications and equipment for media infrastructure in teaching spaces. EMAP should be included by the Consultant at all stages of the design process on the integration of media equipment into new classroom facilities.

2. For all instructional spaces, specify data projection equipment, including a data projector, screen, speakers, controls and power & data connections. Confirm specific requirements with EMAP, through the Client Representative.

3. Consideration shall be given for the provision of two (2) projection screens - centre and corner.

4. Most instructional spaces will require a wired lectern, or console, providing the instructor with control of the media systems, lighting etc... The type of console and the features it incorporates will vary from classroom to classroom, depending on the subjects taught and the capacity of the space. The Consultant should confirm these requirements with Facilities Management Division and EMAP for each project. Features of a media console may include:
   - A keyless entry system.
   - Voice amplification equipment, with wireless microphone capability.
   - Network connections.
   - Computer with DVD drive.
   - Controls for zoned and/or dimmed lighting.
   - Data projection controls.
   - Controls for motorized projection screen.
   - Sound controls.
   - Controls for switched A/C outlets.
   - Surge Protected A/C outlets.
5. Wall-mounted network connections, and duplicate wall-mounted lighting controls, sound controls, data projection controls should be provided at the front of the room in addition to the console controls.

6. Specify a telephone connection.

7. In all instructional spaces, specify high frequency infrared Assistive Hearing Systems to provide headphone-based sound reinforcement for those with hearing impairments.

8. Requirements for multiple data connection points (for student use) or wireless data points will be noted in the Program of Requirements.

5.2.12 Fittings, Furnishings & Millwork

1. Loose furniture will be selected by FMD’s Interior Designer, and will be purchased directly by the University. For planning purposes, however, the Consultant should propose general types and sizes of furniture, to be confirmed by FMD.

2. Fixed furniture, such as fixed seating, built-in benches etc… shall be chosen by the Consultant, approved by FMD, and included in the construction Contract.

3. Where tablet-arm chairs are specified, they should be of rugged construction, able to support the weight of a person, and sized to accommodate a laptop computer. When attached to fixed seating, they should be able to fold away when not in use. Specify 10% left-handed tablet arms.

4. Specify a wall-mounted clock. Ensure that the face of the clock is large enough to be visible to occupants at the opposite end of the room. Mount on a side wall, near the front of the room.

5. Confirm requirement for wall-mounted whiteboards or chalkboards with Client Representative. Student and instructor preferences for chalkboards or whiteboards vary depending on the subject of study; therefore, confirm on a case-by-case basis.

6. Specify a wall-mounted tack board at the entrance to each instructional space.

7. A lectern or media console may be required (see Communications & Media requirements above). Confirm with Client Representative. Coordinate millwork design with required equipment and controls. Ensure controls are placed such that the lecturer can reach them without bending down.

8. A demonstration bench may be required. Confirm with Client Representative. See requirements for built-in services above.
5.3  Instructional & Research Laboratory Spaces (Categories 02 & 03)

Section Under Development - Review w/ Workplace Safety & Environmental Protection

5.3.1  General

1. ‘Instructional Laboratory’ refers to a facility used for regularly scheduled instruction which requires special purpose equipment or furnishings for student participation, experimentation, observation, practice or clinical teaching.

2. ‘Research Laboratory’ refers to a room used for laboratory experience, research, or training in research methodology which requires special-purpose equipment or furnishings for staff and graduate students, or professional research & observation. Included in this category are research laboratories and clinical research areas for work at the graduate or post-graduate level.

3. During the Design Development Phase, and again during the Construction Documentation Phase, at 60% and 99% completion, drawings for laboratories and animal facilities shall be provided by the Consultant to FMD - Workplace Safety and Environmental Protection (WSEP) to review for occupational hazards. A thorough and complete review of activities to be conducted in the work area will be completed. WSEP staff will determine the hazard classification of each laboratory, and will refer designers to appropriate regulations, standards or guidelines for each area as required.

4. The University is committed to maintain all laboratory and research facilities to a minimum nuclear substance level II and/or biocontainment level II laboratory standards. Any alternate laboratory classification must be approved by Workplace Safety and Environmental Protection (WSEP). For the classification of an existing laboratory space, please contact WSEP.

5. All laboratories and research areas and small/large animal facilities on campus must meet the following design criteria for health, safety and environmental aspects. Do not modify or amend any existing facility to less than the following standards.

5.3.2  Reference Standards

1. Laboratories shall conform to the most recent edition of the following regulations, standards, & guidelines, as applicable:
   - CFIA: Canadian Food Inspection Agency (WSEP to add name of document)
   - Canadian Nuclear Safety Commission, CNSC RP, Radiation Protection Regulation.
5.3.3 Location, Design & Dimensions

1. Single-loaded aisles shall be a minimum of 910mm wide. Double-loaded aisles shall be a minimum of 1820mm wide. Aisles should be a maximum of 6000mm long.

2. Office areas shall be located outside of the laboratory, as per PHAC Section 4.1, CNSC GD-52, CFIA Section 3.1.

3. Paperwork stations for data collection may be within the containment laboratory provided they are located away from laboratory work areas, as per PHAC Section 4.1, University, CNSC GD-52, CFIA Section 3.1.

4. Provision shall be made for a separate storage area if significant quantities of hazardous waste are generated. These storage areas shall be secured against unauthorized entry. Refer to CNSC GD-52 and NFC Section 3.2.7.16.

5. Combustible and flammable liquids shall be kept in receptacles that meet the requirements of the National Fire Code of Canada 1990. Refer to SOHS 365.

6. Self-contained enclosures, rooms, or buildings that are isolated from work-related areas and worksites used to store flammable, oxidizing, corrosive, toxic, or dangerously reactive chemicals shall be adequately vented. These areas should also be protected from conditions including excessive temperature, shock or vibration that could reduce the stability or increase the potential hazards of the substance. Refer to SOHS 314.

7. Design for at least 10 cubic meters of space for each worker employed at any one time at a work site. No space that is more than three meters from the floor and no space occupied by solid objects is to be taken into account. Refer to CNSC GD-52 and SOHS Section 68.

5.3.4 Flooring Materials & Finishes

1. Flooring shall be impervious, chemical resistant, and washable, as per CNSC GD-52.

2. Floors shall be slip resistant, as per CFIA section 3.1.

3. Acceptable flooring materials: seamless epoxy, chemical-resistant resilient sheet flooring. Sealed or polished concrete may be used for some research laboratories. Confirm with Client Representative. Consultants shall ensure that the specified flooring material is resistant to damage from the particular chemicals expected to be employed in the laboratory.

4. All joints in the flooring material shall be sealed, as per CNSC GD-52.
5. Flooring shall be coved up walls and cabinets to prevent spills from penetrating underneath them, as per CNSC GD-52.

6. Consider the movement of equipment carts, in the selection of flooring materials and transitions.

5.3.5 Wall Materials & Finishes

1. Acceptable wall finishes: painted gypsum wall board, painted impact-resistance gypsum wall board, painted concrete, painted concrete block, thermoplastic wall protection sheet. Paint finishes shall be a smooth satin finish, non-absorbent and washable. Joints shall be sealed where applicable. Other materials may be considered provided they will withstand laboratory conditions. Refer to CSNC GD-52.

2. Walls shall be constructed to underside of structure, to isolate sound. Seal junction between wall and structural deck or slab. Seal all penetrations.

3. Ensure that laboratory spaces are acoustically isolated from adjacent spaces.

4. Specify wall protection to a height of 1200.

5. Specify corner guards.

5.3.6 Ceiling Materials & Finishes

1. Acceptable ceiling materials: painted moisture-resistant gypsum wall board, suspended acoustic ceiling tile.

2. Consider omitting ceiling materials from research laboratories where appropriate.

3. Acoustic ceiling tile system shall conform to standard ceiling tile specification for wet labs - refer to Part 6, Section C3031 - Suspended Acoustic Ceiling Tile Systems.

4. Suspension system to be humidity, corrosion and chemical resistant.

5.3.7 Doors & Windows

1. Doors & frames shall be painted steel, stainless steel, safety glass or other robust, non-absorptive material (wood is not acceptable), as per PHAC Section 4.2

2. Size of door openings shall allow passage of all anticipated equipment. (PHAC Section 4.1) At a minimum, specify doors with a minimum clear opening dimension of 910mm. For larger rooms, double doors are preferred, each leaf minimum 910mm.

3. Specify a narrow side lite or a view lite in the door itself.

4. Specify a minimum of two (2) exits for laboratories larger than 200 s.m.

5. For larger laboratory spaces, doors should be located at the rear of the room.

6. Doors shall be finished with a satin paint or clear finish, non-absorbent and washable.

7. Perimeter doors to the laboratory shall be lockable so that only authorized persons have access. Card access system preferred. Comply with CNSC GD-52, PHAC Section 4.1.

8. If the premise utilizes card access, recommend installing a card reader for access control, per CNSC Security Standard).

9. All door lites or large vents (grills) shall be fitted with security glazing or bars, metal grill, etc., as per CNSC Security Standard.
10. Space to mount appropriate signage should be available near door. (e.g. designation of laboratory, safety precautions required prior to entry, etc.), as per CNSC RP Section 21, PHAC Section 4.1.

11. Specify automatic door closers on all perimeter doors. Perimetre doors are required to be kept closed at all times, as per CFIA Section 3.1.

12. Windows, if operable, shall be protected by fly screens, as per PHAC Section 4.4.

13. Windows on ground floor shall provide adequate level of security to prevent unauthorized access to the area, as per CFIA Section 3.1 and CNSC Security Standard.

14. Window design shall be integrated with the HVAC system to avoid condensation, wetting and/or frost build-up as per CFIA Section 3.1.

15. Laboratory zone shall be proofed against entry or exit of vermin or insects, as per CFIA Section 3.1.

5.3.8 Acoustic

1. Design laboratories to ensure a minimum Sound Transmission Class (STC) rating of 50.

5.3.9 HVAC

1. Fume Hoods: requirements for laboratory fume hoods vary from project to project depending on the type of mechanical system, type of laboratory and type of contaminants to be exhausted. Particular requirements apply to radioisotope and perchloric acid fume hoods. Consultants are directed to review fume hood requirements for each Project with FMD’s Mechanical Engineer.

2. Laboratory shall be at negative pressure with respect to surrounding areas. Non recirculated air should be supplied. Refer to CNSC GD-52, PHAC Section 4.3, and CFIA Section 3.1

3. HVAC air distribution shall be designed to minimize dead air space within laboratory. Refer to CFIA Section 3.1.

4. Laboratories shall have a minimum of 10 air changes per hour under normal operations. Refer to CFIA Section 3.1 and CNSC GD-52.

5. Supply and exhaust diffusers shall be located to provide convection patterns that ensure airflow away from laboratory entrance. Refer to CFIA Section 3.1.

6. For equipment venting requirements, refer also to Section 5.3.15 - Laboratory Equipment, below.

7. Refer also to Part 6, Section D30 - HVAC.

5.3.10 Plumbing

• Exposed laboratory services piping with stand-offs shall be allowed access for maintenance and cleaning. Refer to CFIA Section 3.1.

• Specify an Emergency Shower in each laboratory area where there is “a risk of substantial contamination of a worker or of a worker’s clothing from corrosive or other harmful substances”. Readily accessible means accessible within 10 seconds or 16 meters anywhere in the risk area. Refer to Part 5, Section 5.24 - ‘Emergency Showers & Eye Washes’. Refer also to ANSI Z358.1, PHAC Section 4.5, CFIA Section 3.1, CNSC GD-52, and SOHS Guideline.
Specify an eye flush in each laboratory where there is “a risk to the eyes of a worker from corrosive or other harmful substances”. Readily accessible means accessible within 10 seconds or 16 meters anywhere in the risk area. Refer to Part 5, Section 5.24 - ‘Emergency Showers & Eye Washes’. Refer also to ANSI Z358.1, PHAC Section 4.5, CFIA Section 3.1, CNSC GD-52, and SOHS Guideline.

Locate a hand washing sink near the laboratory exit. The hand washing sink shall be provided with a ‘hands free’ faucet. The hand washing sink shall be separate from the wash-up/disposal sink in the lab. Sink drain traps shall be accessible. Refer to CNSC GD-52 and PHAC Section 4.5.

Specify drains to be constructed of chemical-resistant material. Refer to CNSC GD-52.

Specify a backflow protection device to prevent potentially contaminated effluent from entering the public water system. Refer to CNSC GD-52.

Specify integral epoxy resin sinks in epoxy resin work surfaces. Durcon or approved alternative. Refer to CNSC GD-52.

Sinks shall have overflow outlets. Refer to CNSC GD-52.

Emergency natural gas shut-off valves shall be located outside the laboratory.

5.3.11 Electrical

1. Lighting should be zoned and switched to light common aisles and aisles between benches separately. Occupancy sensors may be provided in each aisle between benches where the sensor range is limited to that aisle. A manual switch for common aisles should be located at each door. Manual switches for the bench aisles may be located at the end of the aisle. Photocell control may be provided using either on/off, bi-level or continuous dimming.

2. Provide emergency lighting as required by the NBC except in wet labs with an occupant load greater than 25 or where the materials handled require a higher level of personnel safety. Emergency lighting in labs should be switched but provided with a relay to come on in the event of a power failure. Refer to CNSC GD-52.

3. Provide emergency power to critical items such as biological safety cabinets, fume hoods, freezers, emergency lighting, etc. Refer to CFIA Section 3.1 and CNSC GD-52.

4. Light ballasts shall be on a separate distribution layout from the normal or emergency power to minimize harmonic current problems for sensitive lab equipment. High density discharge (HID) lamps with lengthy re-strike times shall be avoided where there is no alternate quick strike light source. Refer to CFIA Section 3.1.

5. Refer also to Part 6, Section D50 - Electrical.

5.3.12 Fire Protection

1. Provide portable fire extinguishers in compliance with the requirements of NFPA 10 - ‘Standard for Portable Fire Extinguishers’, and WSEP requirements.

5.3.13 Communications & Media

1. For any laboratories that are oriented and designed so that a lecture situation can occur, provide data projection equipment, including data projector, screen, speakers, power and data connections.
5.3.14 Fittings, Furnishings & Millwork

1. Biohazard cabinets (or Biosafety cabinets) shall comply with NSF/ANSI 49-2010, Biosafety Cabinetry: Design, Construction, Performance, and Field Certification, for Class II Biohazard Cabinetry. All such installations must be approved at both the design stage and following installation by the Biosafety Manager of the University’s Department of Workplace Safety and Environmental Protection (WSEP).

2. Cupboards and shelving, including hardware shall be smooth, impervious, chemical-resistant and washable, as per CNSC GD-52.

3. Drawers to be equipped with catches, to prevent the drawer from being pulled out of the cabinet. Refer to CFIA Section 3.5.

4. Reagent shelving to be equipped with lip edges or some other method to prevent migration of substances off the shelf. Refer to CFIA Section 3.5.

5. Specify 25mm thick epoxy resin work surfaces, counters & benchtops with integral epoxy resin sinks as required. Durcon or approved alternative. Work surfaces shall be smooth, impervious, chemical, heat, scratch, and impact resistant. If joint required, joint must be sealed, as per CNSC GD-52 and PHAC Section 4.2. Counters & benchtops should include a lip to prevent run-off onto the floor. If the countertop abuts a wall, it shall either be coved or have a back-splash against the wall, as per CNSC GD-52 and PHAC Section 4.2.

6. Laminar flow clean air devices, such as clean benches, shall comply with the Institute of Environmental Sciences (IES) standard IES-RP-CC002.

7. Arrange furnishings to allow easy access to an exit.

8. Laboratory casework should be designed or specified to a standard module where feasible.

9. Specify chemical-resistant storage trays inside storage cabinets, to contain spills.

10. Specify hand soap dispensers and paper towel dispensers in all research and instructional labs.

11. Specify hooks to be provided within the room, close to the room exit, for removal of laboratory coats. Refer to PHAC Section 4.5 and CNSC GD-52.

5.3.15 Laboratory Equipment

1. Autoclaves:
   • Obtain approval from WSEP prior to purchase.
   • Assign space for autoclaves in laboratories or laboratory zones that handle infectious agents. Refer to CFIA Section 3.1 and PHAC Section 4.4.
   • Installation of an autoclave requires a permit from the Saskatchewan Boiler and Pressure Vessel Safety Branch.

2. Biosafety Cabinets (BSC):
   • Obtain approval from WSEP prior to purchase.
   • BSCs shall be located away from high traffic areas, doors and air supply/exhaust ducts that may interrupt air flow patterns. Refer to CFIA Section 5.2.
   • Minimum of 30 cm clearance shall be provided on each side of the cabinet to allow for access. Refer to CFIA Section 5.2.
Minimum clearance of 30 cm shall be provided between exhaust outlet on top of cabinet and any overhead obstructions. Refer to CFIA Section 5.2.

For ducted cabinets, blowers on the exhaust system shall be located at the terminal end of the duct work. Refer to CFIA Section 5.2.

Failure of exhaust flow shall signal an alarm to the user. Refer to CFIA Section 5.2 and NSF/ANSI 49 -2007.

The provision of gas to a BSC shall NOT be provided. Refer to CFIA Section 5.2.

BSCs shall be certified in accordance with the NSF/ANSI 49 -2007 prior to first use. Refer to CFIA Section 5.2.

A2 type cabinets should be ducted out of the building by means of a “canopy” connection. Refer to PHAC Section 9.2

B2 type cabinets shall be exhausted 100% through its own duct work which has a HEPA filter installed. Refer to NSF/ANSI 49 -2007.

B2 type cabinets shall be vented outside the building without recirculation. Refer to NSF/ANSI 49 -2007.

All ducting for BSCs shall be constructed of smooth, impervious, washable, chemical and corrosion-resistant material. All joints to be smoothly finished and sealed. Refer to NSF/ANSI 49 -2007.

The venting system shall include a damper in the duct near the cabinet to permit flow adjustment closure and decontamination. Refer to NSF/ANSI 49 -2007.

The exhaust fan shall be located at the end of the system and outside the ducting. Refer to NSF/ANSI 49 -2007.

The cabinet shall be interlocked with the blower in the duct or the building system to prevent pressurization of the exhaust system. Refer to NSF/ANSI 49 -2007.

A voltage regulator should be installed in order to reduce the potential of variations in airflows. Refer to NSF/ANSI 49 -2007.

Roof exhaust systems serving BSCs shall have a stack that extends straight upward a least 3 m above the roof surface to avoid re-entrainment by the building, and should be increased in elevation when necessary to avoid the influence of surrounding structures. Refer to NSF/ANSI 49 -2007.

Raincaps or any other structure that deflects the straight upward flow of the discharge air should be avoided. Refer to NSF/ANSI 49 -2007.

The canopy above the BSC shall be removable for decontaminating the BSC.

3. Fume Hoods

The fume hood and all ducting shall be constructed of smooth, impervious, washable, chemical and corrosion-resistant material. All joints to be smoothly finished and sealed. Refer to CNSC GD-52.

Each fume hood shall have a continuous monitoring device for proper functioning of the hood. An alarm, either visual or audible, shall be present to indicate reduced air flow. Refer to CNSC GD-52 and SOHS Section 66(3).

Consideration during design to ensure maximum allowance of fume hoods in the area can be maintained by the overall building air flow dynamics. Refer to SOHS Section 66(3b).
• Fume hoods shall not be used as the sole source of room exhaust. Refer to CNSC GD-52.

• Testing of fume hoods upon initial installation shall be in accordance with CSA standard Z316.5-94. Refer also to CFIA Section 4 and CNSC GD-52.

• Work surface areas shall be strong enough to bear the weight of shielding materials that may be required (nuclear substances may require lead shielding). Refer to CNSC GD-52.

• Fume hood shall have a means of containing a minor spill. Refer to CNSC GD-52.

• The interior of the fume hood shall have coved corners for easy decontamination and clean-up. Refer to CNSC GD-52.

• Fume hoods shall not be located near any entrances, operable windows, high traffic areas or where air currents or turbulence may occur. Refer to CNSC GD-52.

• To avoid interference, supply air vents shall be installed away from fume hoods. Refer to CNSC GD-52.

• The front sash shall be at least 1.5 m away from air supply and exhaust diffusers. Refer to CFIA 4.

• Air vented through the fume hood shall not be recirculated. Refer to CNSC GD-52.

• The front of a fume hood shall be at least 1.5 m away from doorways and 2.0 m away from opposing walls or other obstructions. Refer to CFIA Section 4.

• Fume hoods shall not be located directly opposite seated workstations, other fume hoods or biological safety cabinets. Refer to CFIA Section 4.

• The side of the fume hood shall be 0.3 m away from walls or other obstructions projecting beyond the plane of the sash and 1 m away from doorways. Refer to CFIA Section 4.

• Fume hood exhausts located on the roof shall be positioned as far away as possible from any air intakes, to prevent recirculation of the fume hood emissions (minimum recommended distance is 15.24 m from an intake). If the air intake is less than 15.24 m from the stack, no rain caps shall be installed on the stack. Refer to SOHS Section 66 and CNSC GD-52.

• The stack velocity shall be at least 1.4 times the average wind velocity. Refer to CNSC GD-52.

• The stack height shall be at least 3.05 m above the highest point on any adjacent roofline or air intake. Discharge shall be directed vertically upward. Refer to CNSC GD-52.

• Stacks shall be placed downwind of the air intakes (based on the average wind direction). Refer to CNSC GD-52.

• Fume hood exhaust fans shall be placed close to the discharge point. Refer to CNSC GD-52.

• Fume hood exhaust fan motor to be mounted outside the exhaust duct.

• Fume hood exhaust ducts shall not connect with other exhaust systems (other fume hoods is acceptable). Provisions shall be made to ensure that the exhaust from one area cannot flow into another area. Refer to CNSC GD-52.

• Fume hood exhaust ducts shall be marked at 3 meter intervals with a hazardous warning symbol. Refer to CNSC GD-52.
• Fume hoods shall be labelled to show which fan or ventilation system they are connected to. Refer to CNSC GD-52.

• The face velocity of the fume hood shall be at a minimum of 0.5 m/s. Refer to CNSC GD-52.

• Provisions shall be in place to ensure the fume hood remains functional if a routine automatic after-hours shutdown system is in place. (This can be managed through Controls - FMD). Refer to CNSC GD-52.

• Fume hood exhaust shall be connected to an emergency power system to maintain functionality if a power failure occurs. Refer to CNSC GD-52.

• Fume hoods should not contain filters. Refer to CNSC GD-52.

• Fume hood exhaust ducts shall be clearly identified on plans supplied to maintenance personnel. Refer to CNSC GD-52.
5.4 Academic and Administrative Offices (Categories 04 & 10)

5.4.1 General
1. ‘Academic Office’ refers to an office used by faculty, researchers, departmental administrative staff, graduate or undergraduate students.
2. ‘Administrative Office’ refers to an office used by administrative staff and support staff.
3. This section describes requirements for both open landscaped offices and enclosed offices, in both of the categories listed above.

5.4.2 Location, Design & Dimensions
1. Standard office sizes and areas vary according to job classification and use. Required sizes and areas will be provided in the Program of Requirements.
2. Locate office reception area to provide casual surveillance of adjacent office space.

5.4.3 Flooring Materials & Finishes
3. Floor structures may be required to support high-density storage. Confirm requirements with Client Representative.

5.4.4 Wall Materials & Finishes
1. Acceptable wall assemblies: gypsum wall board & stud, demountable wall systems. (Other assemblies may be considered where greater fire resistance ratings are required.)
2. Due to the frequency of changes within office areas, the use of demountable wall systems is encouraged.
3. Specify acoustic insulation for enclosed offices.
4. Maximise clear glazing around entrances to office areas, in order to improve sightlines with regard to personal safety.

5.4.5 Ceiling Materials & Finishes
1. Where ceilings are required, specify suspended acoustic ceiling tile system. Consider also the use of partial drywall bulkheads and valences at perimeter of room.
2. Ceilings may be partially or completely omitted, provided adequate acoustic control is achieved by other means. Normally, 80% coverage of ACT or other sound absorptive material is sufficient to provide adequate sound absorption in office environments.
5.4.6 Doors & Windows
1. Specify doors with a minimum clear opening dimension of 910mm.
2. Specify a side lite with each door into an enclosed office.
3. Design to maximize interior daylighting and views.
4. Sill heights in office areas should be high enough to permit effective use exterior wall areas.

5.4.7 Acoustic
1. Design offices to ensure a minimum Sound Transmission Class (STC) rating of 45.
2. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.55.

5.4.8 HVAC
1. Add Information.
2. Refer also to Part 6, Section D30 - HVAC.

5.4.9 Plumbing
1. Specify a dual-bowl sink for each kitchenette provided.

5.4.10 Electrical
1. Provide line voltage occupancy sensors in each enclosed office. Lights should be required to be manually turned on and should shut off automatically.
2. Open landscaped offices should be zoned and switched both manually and automatically with occupancy sensors. Photocell control may be provided using either continuous or bi-level dimming.
3. Specify 1 x 4 fluorescent lighting fixtures to achieve specified minimum illumination levels.
4. Refer to section D5020 Lighting & Branch Wiring for required illumination levels.
5. Refer also to Part 6, Section D50 - Electrical.

5.4.11 Communications
1. Specify data connection point(s) to each workstation. Number of lines to be specified in the Program of Requirements.
2. Specify telephone connection point(s) to each work station. Number of lines to be specified in the Program of Requirements.

5.4.12 Fittings, Furnishings & Millwork
1. Coat Storage: Provision should be made for coat storage within each private office area, either as coat bars or closets. General and open offices should be provided with secure central storage areas for coats and personal items.
2. Specify wall-mounted shelving as per Program of Requirements. Provide continuous blocking in walls to receive shelving.

3. Ensure that furniture and millwork is chosen and located to avoid interference with perimeter radiant heating systems. The convection function of these radiators requires the free flow of air around the unit. Coordinate with FMD interior designers to ensure that furniture does not block the air intake grilles.

4. *For consideration: Kitchenette*
5.5 **Meeting Rooms (Categories 04 & 10)**

5.5.1 **General**
1. This section describes requirements for meeting rooms and seminar rooms in academic and administrative office areas.

5.5.2 **Location, Design & Dimensions**
1. Size of Meeting Rooms will vary according to number of expected occupants. Required sizes and areas will be provided in the Program of Requirements.

5.5.3 **Flooring Materials & Finishes**

5.5.4 **Wall Materials & Finishes**
1. Acceptable wall assemblies: gypsum wall board & stud, demountable wall systems. (Other assemblies may be considered where greater fire resistance ratings are required.)
2. Due to the frequency of changes within office areas, the use of demountable wall systems is encouraged.
3. Maximise clear glazing between Meeting Rooms and adjacent corridors. At a minimum, specify a side lite next to the door(s). Glazing should be provided with blinds for light control.

5.5.5 **Ceiling Materials & Finishes**
1. Specify suspended acoustic ceiling tile system. Consider also the use of partial drywall bulkheads and valences at perimeter of room.

5.5.6 **Doors & Windows**
1. Specify doors with a minimum clear opening dimension of 910mm.
2. Specify a side lite for each door into a Meeting Room.
3. Windows are generally not required in meeting rooms, and can make data projection difficult. Windows may be considered for meeting rooms, but should be fitted with black-out blinds.

5.5.7 **Acoustic**
1. Design meeting rooms to ensure a minimum Sound Transmission Class (STC) rating of 50.
2. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.55.
5.5.8 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add Information.

5.5.9 Electrical
1. Provide zoned, switched lighting suitable for flat screen viewing. An occupancy sensor with manual on should be provided. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control may be on/off, bi-level or continuous dimming.
2. Specify 1 x 4 fluorescent lighting fixtures to achieve illumination levels.
3. Refer to section D5020 Lighting & Branch Wiring for required illumination levels.
4. Refer also to Part 6, Section D50 - Electrical.

5.5.10 Communications
1. Specify data connection point(s) and/or wireless network access as specified in the Program of Requirements. Review design with the University’s Educational Media Access and Production (eMAP) unit and ITS.
2. Consider the provision of paperless meeting capability, including wireless network access and table-top power outlets.
3. Specify a minimum of 1 telephone connection point to Meeting Room, or as specified in the Program of Requirements.
4. Specify multi-media equipment, including audio & video systems, with appropriate power & data connections. Confirm specific requirements with the Client Representative and eMAP.

5.5.11 Fittings, Furnishings & Millwork
1. Specify counters and cupboards as per Program of Requirements. Specify continuous blocking in walls to receive shelving.
2. Specify coat hooks.
5.6 Library Facilities (Category 05)

Section Under Development

5.6.1 General
1. ‘Library Facilities’ refers to space, administered by the University Library, and used for the collection, storage, circulation and use of reading and reference materials or other media. Included in this category are Stack Space, Study Space and Library Service Space.

5.6.2 Location, Design & Dimensions

5.6.3 Flooring Materials & Finishes

5.6.4 Wall Materials & Finishes

5.6.5 Ceiling Materials & Finishes

5.6.6 Doors & Windows

5.6.7 Acoustic

5.6.8 HVAC

5.6.9 Plumbing

5.6.10 Electrical
1. Provide zoned, switched lighting. Occupancy sensors may be provided in stack aisles and other suitable locations. Photocell control should be provided where appropriate. Control may be on/off, bi-level or continuous dimming.

5.6.11 Communications

5.6.12 Fittings, Furnishings & Millwork
5.7 Athletic & Recreational Space (Category 06)

Section Under Development

5.7.1 General

1. ‘Athletic & Recreational Space’ refers to an indoor space used for athletic activities, or to watch athletic activities. Included in this category are gymnasiums, basketball courts, handball courts, squash courts, exercise rooms, wrestling rooms, swimming pools, ice rinks, training rooms and dance studios.

5.7.2 Location, Design & Dimensions

5.7.3 Flooring Materials & Finishes

5.7.4 Wall Materials & Finishes

5.7.5 Ceiling Materials & Finishes

5.7.6 Doors & Windows

5.7.7 Acoustic

5.7.8 HVAC

5.7.9 Plumbing

5.7.10 Electrical

1. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control may be bi-level or continuous dimming.

5.7.11 Communications

5.7.12 Fittings, Furnishings & Millwork
5.8 Change Rooms & Shower Rooms (Category 06)

5.8.1 General
1. ‘Change Rooms & Shower Rooms’ refer to spaces used for changing & showering. These may be associated with athletic & recreational facilities or may be an amenity provided to occupants in other types of facilities.
2. For Consideration: At a minimum, to encourage active forms of transportation, provide Change & Shower Rooms sufficient for 5% of regular building occupants, unless otherwise directed by Facilities Management Division.
3. Signage shall be in accordance with current University standard. Refer to Appendix XXX.
4. Adjoining men’s and women’s change rooms & shower rooms should be acoustically isolated.
5. Design change rooms & shower rooms for ease of maintenance and cleaning.

5.8.2 Location, Design & Dimensions
1. Change rooms and shower rooms shall be designed to adjoin or incorporate a washroom.
2. There should be no direct line of sight from the corridor into a change room or shower room.
3. Where possible, change rooms & shower rooms are to be designed “airport-style”, without doors. Where doors are used, they should not be fitted with locks.
4. In installations of three or more grouped showers, specify gang showers without divisions, rather than individual shower stalls. This provision is due to the difficulty of adequately ventilating and cleaning enclosed shower stalls.
5. Shower room to incorporate a dry-off area.

5.8.3 Flooring Materials & Finishes
1. Acceptable flooring materials in change rooms: ceramic tile, sealed concrete. Ensure floor surface is non-slip.
3. Linoleum is not approved for use in change rooms or shower rooms.
4. Specify coved base to match flooring.
5. Slope floors to drain.

5.8.4 Wall Materials & Finishes
1. Acceptable wall assemblies in change rooms: painted concrete block, ceramic tile on concrete block.
3. Walls shall be constructed to the underside of structure.
5.8.5 Ceiling Materials & Finishes
1. Acceptable ceiling finishes in change rooms: suspended acoustic ceiling tile, painted gypsum wall board. Acoustic ceiling tile system shall conform to standard ceiling tile specification for wet labs - refer to Part 6, Section C3031 - Suspended Acoustic Ceiling Tile Systems. Note: specify moisture-resistant GWB (or other impervious material) in areas of Change Rooms subject to elevated humidity, such as near shower rooms.
2. Acceptable ceiling finishes in shower rooms: ceramic tile on moisture-resistant gypsum wall board, or other water-proof finish to be approved by Client Representative.

5.8.6 Doors & Windows
1. Specify doors with a minimum clear opening dimension of 910mm.
2. Wood doors and frames are not to be used in areas exposed to moisture or high humidity.

5.8.7 Acoustic
1. Design change rooms & shower rooms to ensure a minimum Sound Transmission Class (STC) rating of 55 between change rooms & shower rooms and adjacent enclosed rooms.
2. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.60.

5.8.8 HVAC
1. Ensure change rooms and shower rooms are under negative pressure, to control odour & humidity.
2. Ensure shower areas are ventilated adequately to prevent mould growth.
3. Refer also to Part 6, Section D30 - HVAC.
4. Add information.

5.8.9 Plumbing
1. Specify floor drains and ensure all areas of the floor slope toward them.
2. Add information.

5.8.10 Electrical
1. Provide zoned, switched lighting. Occupancy sensors should be provided in change room area. If a suitable product is available for high humidity, sensors should also be provided in the shower room.
2. At least one light fixture should be on emergency power and unswitched.
3. Refer also to Part 6, Section D50 - Electrical.

5.8.11 Fittings, Furnishings & Millwork
1. All fittings and accessories shall be brushed or satin stainless steel finish where possible.

2. Counter Tops: In Change Rooms, specify plastic laminate, composite solid surfacing or stainless steel. In Shower Rooms or areas adjacent to shower rooms, specify composite solid surfacing or stainless steel. Specify wall-hung bracing to countertops at a minimum of 1200 o.c.

3. Soap Dispenser: Specify one liquid soap dispenser for each shower.

4. Mirrors: Specify full-length mirrors as required for size of change room (one minimum). One mirror to be located near room entrance. Mirror location should not provide viewing into washroom from corridor or entry.

5. Lockers: Steel w/ baked enamel finish. Where top surface is exposed, specify sloped top. Quantities, dimensions & keying requirements shall be provided in the Program of Requirements.

6. Benches: Specify benches near lockers. Length shall be provided in the Program of Requirements.

7. Tackboard: Specify one tackboard near change room entrance.

5.9 Food Service Facilities (Category 07)

Section Under Development - Review with Consumer Services

5.9.1 General
1. ‘Food Service Facilities’ refers to space used for the preparation, serving or consumption of food. Included in this category are franchised food outlets, dining halls, buffeteria, coffee shops, vending areas, food courts, kitchens, food storage, food preparation areas, dishwashing areas, etc...
2. Detailed planning and technical requirements for food service facilities will be determined by the University on a project-by-project basis.

5.9.2 Location, Design & Dimensions
1. In general, food service facilities should be located near a main access point in the Building or on main pedestrian systems.
2. The design should allow for adjacent traffic flows and not impede on corridor traffic flows.
3. Electrical services should be supplied from a dedicated panel located in that area.

5.9.3 Flooring Materials & Finishes

5.9.4 Wall Materials & Finishes

5.9.5 Ceiling Materials & Finishes

5.9.6 Doors & Windows

5.9.7 Acoustic
1. Design food service facilities to ensure a minimum Sound Transmission Class (STC) rating of 55 such facilities and adjacent enclosed rooms.
2. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.60.

5.9.8 HVAC

5.9.9 Plumbing

5.9.10 Electrical
1. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations such as walk-in coolers and freezers.
2. Electrical services should be supplied from a dedicated panel located in that area.

5.9.11 Communications

5.9.12 Fittings, Furnishings & Millwork

1. Each food service facility shall be provided with a waste and recycling collection point. Refer to Part 6, Section E1092 - Solid Waste Handling Equipment for specification of waste and recycling containers.
5.10 Common Use Space and Student Activity Space (Category 14)

Section Under Development

5.10.1 General
1. ‘Common Use Space and Student Activity Space’ refers to space available to the general University population intended for recreation, rest or relaxation. Included in this category are pool & billiard rooms, ping-pong rooms, multi-purpose rooms, TV Rooms, student club rooms, common rooms & student lounges.

5.10.2 Location, Design & Dimensions

5.10.3 Flooring Materials & Finishes

5.10.4 Wall Materials & Finishes

5.10.5 Ceiling Materials & Finishes

5.10.6 Doors & Windows

5.10.7 Acoustic

5.10.8 HVAC

5.10.9 Plumbing

5.10.10 Electrical
1. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control may be on/off or bi-level dimming.

5.10.11 Communications

5.10.12 Fittings, Furnishings & Millwork
5.11 Assembly and Exhibition Facilities (Category 15)

Section Under Development

5.11.1 General

1. ‘Assembly and Exhibition Facilities’ are spaces intended for dramatic, film or musical performances, religious activities, general meetings, artistic exhibits or museum exhibits. Included in this category are auditoria, theatres, museums and galleries.

5.11.2 Location, Design & Dimensions

5.11.3 Flooring Materials & Finishes

5.11.4 Wall Materials & Finishes

5.11.5 Ceiling Materials & Finishes

5.11.6 Doors & Windows

5.11.7 Acoustic

5.11.8 HVAC

5.11.9 Plumbing

5.11.10 Electrical

1. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control may be on/off or bi-level dimming.

5.11.11 Communication

5.11.12 Fittings, Furnishings & Millwork
5.12 **Main Public Entrances & Lobbies (Category 16)**

5.12.1 **General**

1. ‘Main Public Entrances & Lobbies’ refer to a building’s primary entrance and its associated lobby space. Often a building will feature two or more equally-sized entrances which should be designed to this standard.

2. Entrances represent a major point of energy loss from a building and generally are the weakest point in a building envelope system; therefore, special care should be taken in designing entrances to be as thermally efficient as possible. Design mechanical systems at entrances to prevent condensation and freezing.

3. Design entrance components to be resistant to vandalism.

4. Design entrances to avoid problems relating to snow drifting, melting, and ice formation.

5.12.2 **Location, Design & Dimensions**

1. The number and placement of entrances and exits depends upon many factors; however, for reasons of control, security and cost, it is required that the number of entrances be kept to a minimum. Each entrance should serve as many uses as possible, however; undesirable conflicting uses should be avoided.

2. Coordinate location of entrances with vehicular and pedestrian access to the Building.

3. All regularly used entrances that are directly connected to the outdoors or other contaminant generating spaces shall employ entryway systems shall be at least 3 metres (10 feet) long in the primary direction of travel to capture dirt and particulates entering the building. A permanent recessed foot grating system must comprise at least 1 metre (3 feet) of the 3 metre (10 feet) requirement. Walk-off/Roll-out mats are acceptable for the remainder of the length.

4. At entrances required to be barrier-free, ramping should be provided with the site grading where possible, or be incorporated indoors.

5. Where wheelchair ramps are provided outdoors, they shall be a minimum clear width of 1800 mm. Note that this minimum width is in excess of the minimum building code requirement in order to accommodate snow clearing equipment.

6. Design for protection of the doorway against weather in the form of an overhang, canopy or recess.

7. Design the exterior areas adjacent to entrances with a concrete pad, rather than asphalt paving.

8. Design main public entrances & exits to include a vestibule. The functions of the vestibule are to providing a buffer against the weather, a place for cleaning shoes, and a space where people may wait out of the main circulation path. Design vestibule to include a waiting area for wheelchair users, with clear sightlines to vehicular drop-off point.

9. Where possible, consider placement of a staffed area such as a reception counter or office area within sight of the entrance, to provide casual surveillance.
5.12.3 Flooring Materials & Finishes
1. Acceptable flooring materials: polished concrete, terrazzo, ceramic tile, vinyl composition tile. Linoleum may be considered only for areas that will not be subject to excessive moisture from foot traffic.
2. Interior floor finishes at entrance doors should be of a non-slip construction for a distance of 5000 mm.
3. Specify a permanent recessed foot grating system at all main entrances, unavoidable upon entering. No drainage system is required.

5.12.4 Wall Materials & Finishes
1. Acceptable wall finishes: abuse-resistant drywall, concrete, concrete block, brick, stone, ceramic tile, hardwood-veneer plywood. Other materials will be considered upon request.

5.12.5 Ceiling Materials & Finishes
1. Acceptable ceiling finishes: in corridors and entrances, the intention is to provide the Consultant with scope for a wide variety of options in ceiling finishes. These may include, but are not limited to: acoustic tile, wood tile, metal tile, gypsum wall board, linear wood, linear metal.
2. With all ceiling systems, adequate provision should be made for easy access to concealed services. The Consultant shall demonstrate that the proposed material fulfills this requirement before it is accepted.
3. Where Acoustic Tile Ceiling Systems are employed, consider also the use of partial drywall bulkheads and valences, to avoid monotonous design.
4. Where appropriate, ceilings may be omitted, provided the design of HVAC and electrical services are aesthetically controlled, and sufficient acoustic control may be achieved without ceilings.

5.12.6 Doors & Windows
1. Specify doors in accordance with exiting requirements stipulated in the National Building Code.
2. Each door leaf, in either single or double door configurations, shall be of a minimum dimension of 910mm.
3. Specify barrier-free door operators at all main public entrance doors.
4. Maximize the use of clear glazing at entrances, to provide passive surveillance. Ensure clear sightlines to vehicular drop-off where applicable.
5. All glass at entrances, whether in fixed window units or in doors, shall be wired or tempered. Consider the provision of safety bars to prevent hazards and breakage.

5.12.7 HVAC
1. Refer to Part 6, Section D30 - HVAC.
5.12.8 Electrical
1. Vestibule or entrance lights may be controlled on/off by a photocell if practical.
2. Refer also to Part 6, Section D50 - Electrical.

5.12.9 Communications
1. Consideration shall be given for the provision of a pay telephone or courtesy telephone. Confirm requirement with *Client Representative*.

5.12.10 Fittings, Furnishings & Millwork
1. Consideration may be given for minimal seating, to be determined on a *Project* by *Project* basis.
2. Built-in facilities inside vestibules should be entirely clear of the floor to facilitate cleaning.
3. Specify waste receptacles and recycling containers inside the building, near, but not within, the vestibule. Waste receptacles should also be provided on the exterior of public entrances including provision for an ash receptacle set at a minimum distance of 10 meters away from the doors. (Note: A 10 meter clearance is also required from any exterior ash receptacle to air intakes).
4. Notice boards, directories and similar wall-mounted items should be minimized within vestibules.
5. All buildings shall be provided with a building directory near the main entrance. For design requirements, refer to Part 6, Section C1030 - Fittings & Specialties.
6. As directed by the University, consideration should be given to providing an information desk, notice boards, commemorative plaques, planter(s), lounge seating, display facilities and directional signs.
7. Planters should be considered for lobbies & other public spaces.
5.13 Secondary Public Entrances (Category 16)

5.13.1 General
1. ‘Secondary Public Entrances’ refer to any entrance and lobby space of significantly lesser importance to a main entrance. Requirements for the secondary entrances will depend on the relative importance of that entrance in the circulation patterns of the building.
2. Design entrance components to be resistant to vandalism.
3. Design entrances to avoid problems relating to snow drifting, melting, and ice formation.

5.13.2 Location, Design & Dimensions
1. Coordinate location of entrances with vehicular and pedestrian access to the Building.
2. At entrances required to be barrier-free, ramping should be provided with the site grading where possible, or be incorporated indoors.
3. Refer to Section 6.2 for minimum ramp dimensions.

5.13.3 Flooring Materials & Finishes
1. As per Section 5.2, “Main Public Entrances”.

5.13.4 Wall Materials & Finishes
1. As per Section 5.2, “Main Public Entrances”.

5.13.5 Ceiling Materials & Finishes
1. Where ceilings are required, specify suspended acoustic ceiling tile system.

5.13.6 Doors & Windows
1. Specify doors in accordance with exiting requirements stipulated in the National Building Code.
2. Each door leaf, in either single or double door configurations, shall be of a minimum dimension of 910mm.
3. Specify either a side lite or a finger lite at all secondary entrances.
4. All glass at entrances, whether in fixed window units or in doors, shall be wired or tempered safety glass.

5.13.7 HVAC
1. Design mechanical systems at entrances to prevent condensation and freezing.
2. Refer also to Part 6, Section D30 - HVAC.
5.13.8 Electrical
1. Vestibule or entrance lights may be controlled on/off by a photocell if practical otherwise provide occupancy sensor with automatic on function.
2. Refer also to Part 6, Section D50 - Electrical.

5.13.9 Fittings, Furnishings & Millwork
1. Built-in facilities inside vestibules should be entirely clear of the floor to facilitate cleaning.
2. Specify waste receptacles inside the building, near all secondary public entrances.
3. Consider the provision of waste receptacles and an ash receptacle at the exterior of secondary entrances, set at a minimum distance of 10 meters away from the doors.
4. Confirm requirements for notice boards, directories and similar wall-mounted items with the Client Representative.
5.14 Service Entrances (Category 16)

5.14.1 General

1. ‘Service Entrance’ refers to a non-public building entrances serving one or more of the following functions:
   • To provide an entrance for the delivery and shipping of goods and materials.
   • To provide a trans-shipping and holding point for materials and goods entering and leaving the Building;
   • To provide an access point for maintenance and service personnel;
   • To provide an accumulation and pick up point for garbage & recycling.

2. If more than one service entrance is required, at least one should be designed in accordance with the requirements listed below. Secondary entrances will not necessarily require all the components noted.

5.14.2 Location, Design & Dimensions

1. The Building should be designed to limit service access to one service entrance. Because program requirements often require ready-access to a service entrance, considerable care in laying out the Building floor plan is essential if one service entrance is to be sufficient.

2. The Building should present a first class appearance from any direction; therefore, service entrances & loading docks are to be designed with the same care and attention as any other part of the building. Consideration may be given to providing screening. Careful consideration of the design of the service entrance shall be given to make it as attractive as possible.

3. Service entrances are a source of noise, garbage and exhaust odors. Design the service entrance and adjacent spaces to mitigate these problems.

4. Design service entrances to prevent accumulation of snow and ice on the loading dock platform or steps.

5. Minimum Height Clearance: 5 metres for service entrances located under the Building structure. 9 metres is required by some garbage trucks during the dump cycle.

6. Specify a freight or service elevator adjacent to the service entrance in all buildings with more than one floor level. Refer to Part 6, Section D1010 Elevators.

7. Provide a Materials Transfer Room. Refer to Part 5, Section 5.5 below.

5.14.3 Flooring Materials & Finishes


5.14.4 Wall Materials & Finishes


2. Other materials may be considered provided they will withstand institutional traffic.

3. Specify wall protection to a height of 1200.
5.14.5 Ceiling Materials & Finishes
1. Ceilings are not normally required.
2. Where ceilings are required, specify suspended acoustic ceiling tile system.

5.14.6 Acoustic
1. Design service entrances to be acoustically isolated from adjacent spaces. Ensure a minimum Sound Transmission Class (STC) rating of 55.

5.14.7 HVAC
1. Design indoor temperature to **xx deg.C - xx deg. C.**
2. In general, service entrances and loading docks are heated, but not air conditioned.
3. At the service entry, prevent the entry of cold air by blanketing or blowing warm air against the opening.
4. Mechanical exhaust ventilation at service entrances & loading docks may be required in some buildings - confirm this requirement with *Client Representative*.
5. Refer also to Part 6, Section D30 - HVAC.

5.14.8 Plumbing
1. In general, floor drains are not required in services entrances, except where regular wetting is expected, such as:
   - Areas where wash down is required for sanitary reasons.
   - Areas where indoor vehicle storage is provided. Note that where there is an overhead door and it is possible to park a vehicle in the area we are required by City of Saskatoon bylaw to provide a dual compartment grit / oil interceptor which drains to the sanitary sewer system.
2. Confirm this requirement with *Client Representative*.
3. If a floor drain is required and may not receive water on a regular basis, then a trap primer / seal should be provided.

5.14.9 Electrical
1. If the entrance is a designated arrival point for fire trucks, a fire alarm annunciator panel shall be specified. Refer also to “Fire Alarm Systems”, under Part 5.0, Section 5.4, Subsection D, Article D5030 “Communications and Security”.
2. Vestibule or entrance lights may be controlled on/off by a photocell if practical otherwise provide occupancy sensor with automatic on function.
3. Refer also to Part 6, Section D50 - Electrical.
5.14.10 Communications
1. Specify an intercom system designed to notify building occupants when a delivery person is at the loading dock. Confirm specific requirements with Client Representative.

5.14.11 Fittings, Furnishings & Millwork
1. Building name & address signage may be required near the service entrance to guide delivery personnel and fire-fighters. Standard drawings and specifications for building signage are available upon request from the Client Representative.

5.14.12 Loading Docks
1. Design a multi-bay loading dock, with one bay placed primarily for the delivery of materials, furniture, etc., another primarily for refuse pick up, mail delivery and service calls, and possible additional bays to serve particular functions, depending on overall building requirements.
2. The dock elevation should be at floor level. Truck body height should be of consideration and the possible provision of a dock leveler should be considered for at least one bay.
3. Steps should be provided for access from ground level.
4. Weather protection should be provided for both overhead and pedestrian doors.
5. Consideration for ergonomic access to the large outdoor garbage bins should be made for custodial staff.
6. Specify concrete-filled steel bollards as required to protect building from damage.

5.14.13 Doors & Windows
1. The number of overhead doors will be determined on a Project-by-Project basis.
2. Refer to section B2030 for overhead door requirements.
3. Where an overhead door is provided, provide also one door for pedestrian and light goods traffic, with a minimum clear opening width of 910.
4. A boot scraper should be provided near the pedestrian door.
5. Specify double doors, minimum clear opening width 1820, between service entrance and building circulation.

5.14.14 Waste Disposal
Section Under Development - Monica Enns to review.
1. Requirements for waste and recycling collection vary depending on the size and function of the building. Consult with Client Representative to determine requirements.
2. Some buildings may require space for a garbage compactor. Confirm requirement with Client Representative.
5.14.15 Service Yards

1. Specify service vehicle parking stalls, the number to be determined on a Project-by-Project basis, depending on the size of the Building.

2. Provide sufficient room for vehicles to turn around.

3. Provide room for temporary snow-pile accumulation as cleared from the service yard.

4. Consider drainage of the service yard.
5.15 Materials Transfer Room (Category 16)

5.15.1 General
1. The ‘Materials Transfer Room’ is a room located adjacent to the Service Entrance, which provides a trans-shipping and holding point for materials and goods entering and leaving the Building.

5.15.2 Location, Design & Dimensions
1. Locate near the service entrance.
2. Connect directly to the Building circulation system.
3. If a separate freight or service elevator is provided it should open onto the Materials Transfer Room.
4. Specify a holding area about 2000 x 7000. The holding area should be located clear of the routes from the exterior doorways to the interior circulation system so shipments and furniture may move directly through without obstruction. Space allowance for movement and maneuverability of large pieces of equipment should be of consideration.
5. Specify a place for storing a dolly about 1500 x 750.

5.15.3 Flooring Materials & Finishes

5.15.4 Wall Materials & Finishes
2. Specify wall protection to a height of 1200.

5.15.5 Ceiling Materials & Finishes
1. Ceilings are not normally required.
2. Where ceilings are required, specify suspended acoustic ceiling tile system.

5.15.6 Doors & Windows
1. Specify one set of double doors, with a minimum clear opening dimension of 1820mm.

5.15.7 Acoustic
1. Design to be acoustically isolated from adjacent spaces, not including other service rooms. Ensure a minimum Sound Transmission Class (STC) rating of 55.

5.15.8 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2.  *Add Information*

5.15.9  Plumbing
1.  Specify a hose bib conveniently located for washing down both interior and exterior areas, but not on an outside wall (to avoid freezing).

5.15.10  Electrical
1.  Provide occupancy sensor with manual on function.
2.  Refer also to Part 6, Section D50 - Electrical.

5.15.11  Communications
1.  *Add Information.*

5.15.12  Fittings, Furnishings & Millwork
1.  Specify a work counter, about 600 x 2000.
2.  Signs should be provided on any doors leading from the materials transfer room into the building to indicate where they lead.
3.  Consideration should also be made for a condensed building directory.
4.  Specify a small tackboard about 450 x 300 and a chalkboard 600 x 600 for general use.
5.  Specify fire extinguishers and other fire fighting equipment as required by the materials handled in that location.
5.16 Circulation (Category 16)

5.16.1 General
1. ‘Circulation’ refers to corridors, enclosed walkways & pedestrian tunnels.
2. Enclosed walkway systems, connecting buildings to each other, are planned throughout the campus. This system will often extend from and make use of existing building corridor systems. The Consultant may therefore be requested to incorporate a pedestrian walkway through a proposed building. The design of corridor systems within the building may be required to conform to the requirements of the walkway system in terms of width, location and elevation. Facilities Management Division will provide detailed information on these requirements on a case by case basis.

5.16.2 Location, Design & Dimensions
1. In general, corridor widths should be no greater than that required to meet required egress regulations. (Consider replacing this clause with: “Specify corridors that are a minimum of 1500 clear width for general conditions, 2400 clear width for corridors serving assembly spaces, or wider as required to meet building code egress requirements.”)
2. Wider corridors may be necessary where “through” traffic is expected from connections of two or more buildings. Facilities Management Division will provide information as to the requirements for such building “streets”.
3. No obstructions should infringe on the minimum corridor width. Wall-mounted equipment such as fire hose cabinets, drinking fountains, etc… should be recessed where possible.
4. Avoid hidden recesses in corridors.
5. Design long corridors with intermediate opportunities for exiting, to avoid potential opportunities for entrapment.
6. Current fire codes require that doors along certain fire-rated corridors be equipped with closers. As applied to offices, this can be a problem for occupants who follow an “open-door” policy. Corridor systems should be designed to avoid this conflict insofar as possible while still maintaining good office access.
7. Wherever possible, pedestrian walkways shall be designed to have a slope no greater than 1:20.

5.16.3 Flooring Materials & Finishes
1. Acceptable flooring materials: polished concrete, terrazzo, ceramic tile, vinyl composition tile, vinyl sheet flooring. Linoleum may be considered only for areas that will not be subject to excessive moisture from foot traffic.
2. Where applicable, consider the movement of carts, dollies, book trucks etc… in the selection of flooring materials and transitions.
3. In areas adjacent to instructional spaces, avoid the use of ceramic tile or other uneven surfaces, because of the potential for disruptive noise when equipment carts are rolled across such surfaces.
5.16.4 Wall Materials & Finishes
2. Other materials may be considered provided they will withstand institutional traffic.
3. Consider acoustic control in the vicinity of offices and quiet areas.

5.16.5 Ceiling Materials & Finishes
1. Acceptable ceiling finishes: in corridors and entrances, the intention is to provide scope for a wide variety of options in ceiling finishes. These may include, but are not limited to: suspended acoustic ceiling tile systems, wood tile, metal tile, gypsum wall board, linear wood, linear metal.
2. With all ceiling systems, adequate provision should be made for easy access to concealed services. The Consultant shall demonstrate that the proposed material fulfills this requirement before it is accepted.
3. Where suspended acoustic ceiling tile systems are employed, consider also the use of partial drywall bulkheads and valences, to avoid monotonous design.
4. Where appropriate, ceilings may be omitted, provided the design of HVAC and electrical services are aesthetically controlled, and sufficient acoustic control may be achieved without ceilings.

5.16.6 Doors & Windows
1. Primary doors leading into pedestrian walkways and corridors shall be designed to be barrier-free and shall be equipped with either automatic openers or magnetic hold-open devices.
2. Each door leaf, in either single or double door configurations, shall be of a minimum dimension of 910mm.
3. For primary doors leading into pedestrian walkways and corridors, maximise glazing. At a minimum, specify a narrow side lite or a view lite in the door itself.

5.16.7 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add information.

5.16.8 Electrical
1. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations with automatic on. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control may be on/off or bi-level dimming.
2. Power receptacles should be specified in sufficient numbers to require no more than a 15 meter cord for power-driven housekeeping machines. These receptacles should be 15/20 amp T-slot type and not be on the same circuit with receptacles in user spaces.
3. Refer also to Part 6, Section D50 - Electrical.
5.16.9 Fittings, Furnishings & Millwork

1. No obstructions should infringe on the minimum corridor width. Items such as seating, coat racks, drinking fountains, waste receptacles, vending machines and so on, should be recessed, placed in alcoves, or located elsewhere. Wherever possible, corridor, stairwell, and entrance fittings should be wall-mounted rather than floor-standing.
5.17 **Stairs & Stairwells (Category 16)**

5.17.1 **General**
1. Stairwells should have handrails on each side and should be kept free of other hardware.
2. Handrail ends should be turned in to the wall or turned down to prevent catching clothing or other articles.
3. Balustrades and other details should be designed to minimize cleaning problems.

5.17.2 **Location & Dimensions**
1. Exit stair dimensions wider than building code requirements may be considered, where large numbers of students are expected to occupy the corridors and stairs all at once, between classes.
2. More generously-proportioned feature stairs may also be considered, the dimensions of which are up to the discretion of the designer.
3. No obstructions should infringe on the minimum stair width.

5.17.3 **Flooring Materials & Finishes (Including Treads)**
2. Hardwood treads may be acceptable on feature stairs in some locations. To be reviewed by FMD on a case-by-case basis.
3. Linoleum is not approved for use in staircases.
4. Very dark or light colours are discouraged, because they emphasize defects and dirt.
5. Ensure National Building Code requirements are met with respect to slip-resistance, colour-contrast and/or pattern to demarcate the leading edge of treads and landings.

5.17.4 **Wall Materials & Finishes**
1. Acceptable wall finishes: painted abuse-resistant drywall, sealed or painted concrete, exposed or painted concrete block, exposed brick, ceramic tile, hardwood-veneer plywood, glazing.
2. Other materials may be considered provided they will withstand institutional traffic.
3. Maximise clear glazing at stairwells, in order to improve sightlines with regard to personal safety.

5.17.5 **Ceiling Materials & Finishes**
1. Acceptable ceiling finishes: in stairwells, the intention is to provide scope for a wide variety of options in ceiling finishes. These may include, but are not limited to: acoustic tile, abuse-resistant gypsum wall board, linear wood, linear metal, hardwood-veneer plywood, exposed concrete. Acoustic tile should not be specified in stairwells at heights lower than 2750 a.f.f., as it is susceptible to abuse.
2. With all ceiling systems, adequate provision should be made for easy access to concealed services. The Consultant shall demonstrate that the proposed material fulfills this requirement before it is accepted.

3. Where appropriate, ceilings may be omitted, provided the design of HVAC and electrical services are aesthetically controlled, and sufficient acoustic control may be achieved without ceilings.

5.17.6 Doors & Windows
1. Specify doors such that each leaf has a minimum clear opening dimension of 910mm.
2. Maximise glazing in stairwell doors. At a minimum, specify a side lite or a view lite in the door itself.

5.17.7 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add Information.

5.17.8 Electrical
1. Provide unswitched lighting from emergency power source. Occupancy sensors may be provided in suitable locations with automatic on. Photocell control can be provided. Control may be on/off or bi-level dimming. Provide relay for lighting to come on in the event of a power outage.
2. Light fixtures should be located to allow for ease of servicing.
3. T-slot receptacles should be specified on every second landing at a minimum.
4. Refer also to Part 6, Section D50 - Electrical.

5.17.9 Fittings, Furnishings and Millwork
2. Supports shall be of painted steel or stainless steel.
3. Painted steel handrails shall not be used in prominent or “feature” stairs.
5.18 Elevators (Category 16)

Refer to Part 6.0, Section D1010 - Elevators.
5.19 Washrooms (Category 16)

5.19.1 General
1. Separate “Staff” or “Faculty” washrooms (as distinct from student washrooms) should not be specified unless directed otherwise.
2. Washroom signage shall be in accordance with current University standard. Refer to Appendix XXX.
3. Adjoining men's and women's washrooms should be acoustically isolated.
4. As noted in the space requirements, there may be a requirement that some areas be open at night when the rest of the building is closed.
5. Design washrooms for ease of maintenance and cleaning.
6. Do not include a Caretaker's Closet as part of any washroom.

5.19.2 Location, Design & Dimensions
1. Locate washrooms near entrances, stairs, gathering spaces, food service outlets, staff & student lounges, classrooms and lecture theatres.
2. Placement of washrooms should not be such as to draw traffic into what would otherwise be relatively quiet or secured sections of the Building.
3. There should be no direct line of sight from the corridor into a washroom.
4. In addition to the requirements for barrier-free washrooms under the National Building Code, specify also one gender-neutral barrier-free washroom per floor, where practicable. Specify a minimum of one per building. Design to meet National Building Code standards for “Universal Toilet Room”.

5.19.3 Flooring Materials & Finishes
2. Linoleum is not approved for use in washrooms.
3. Specify coved base to match flooring, minimum 100 mm high.
4. Slope floors to drain.

5.19.4 Wall Materials & Finishes
2. Where GWB is used in areas prone to wetting, specify moisture resistant type.
3. Wall finish to be ceramic tile to a minimum height of 1800. Full height ceramic tile is preferred.
4. Surfaces should be light colored, but not white.
5. Walls shall be constructed to the underside of structure.
5.19.5 Ceiling Materials & Finishes
1. Acceptable ceiling finishes: suspended acoustic ceiling tile, gypsum wall board. Where GWB is used in areas prone to wetting, specify moisture resistant type.
2. Consider also the use of partial drywall bulkheads and valences at perimeter of room.

5.19.6 Doors & Windows
1. Where possible, washrooms are to be designed “airport-style”, without doors. Where doors are used, they should not be fitted with locks, and should be single doors, not two doors in series.
2. Where doors are necessary, they shall have a minimum clear opening dimension of 910mm.

5.19.7 Acoustic
1. Design washrooms to be acoustically isolated from adjacent spaces. Ensure a minimum Sound Transmission Class (STC) rating of 55 between washrooms and adjacent enclosed rooms. Provide sound absorptive materials to ensure a minimum NRC rating of 0.85 where doorless entry designs are employed. Consider the use of electronic sound masking.
2. Where doorless entry designs are employed, consider the use of sound masking systems.
3. Design ceiling to achieve a Noise Reduction Coefficient (NRC) of 0.80.

5.19.8 HVAC
1. Design ventilation system to ensure negative air pressure, to control odour.
2. Refer also to Part 6, Section D30 - HVAC.
3. Add information.

5.19.9 Plumbing
1. Where possible a minimum of two sink and two toilet fixtures are to be installed. If the occupancy number of a floor does not justify this number of fixtures then consideration should be given to locating toilet rooms above each other on alternate floors.
2. Layout of fixtures should be logically arranged in order of use.
3. All piping and clean-outs should be concealed where possible.
4. Pipe access space should be provided behind fixture walls for maintenance purposes and also to isolate noise from adjoining areas. All valves shall be accessible.
5. Ensure any mechanical chase/closets are keyed only to the mechanical master keying.
6. Floor drains required by regulations should be in the water closet area, between stalls, and all areas of the floor shall slope toward it.
7. Caulking between fixtures and wall should be with highest quality sealants.
8. Refer also to Section D2010 - Plumbing Fixtures.
5.19.10 Electrical
1. In single occupant washroom provide lighting from emergency power source controlled by manual-on occupancy sensors.
2. In multi occupant washrooms provide at least one fixture, unswitched from emergency power source. Remaining lights to be controlled with automatic on occupancy sensors.
3. Refer also to Part 6, Section D50 - Electrical.

5.19.11 Fittings, Furnishings & Millwork
1. Specify plastic laminate, stainless steel, composite solid surfacing, or polished concrete countertops. Specify wall-hung bracing to countertops at a minimum of 1200 o.c.
2. Specify the following accessories, as per Part 6, Section C1030 - Fittings & Specialties:
   - Toilet Paper Dispensers: 1 locking 2-roll dispenser per cubicle. If space is limited, single roll dispensers are acceptable.
   - Waste Receptacles: Specify 1 surface-mounted 48 litre receptacle for installations serving 1-3 sinks, 2 receptacles for 4 sinks, 3 receptacles for 6 sinks, etc... Surface-mounted bins should be located near sinks. Where space permits, also specify a free-standing 125 litre capacity bin positioned near door.
   - Baby Change Stations: 1 per washroom, or where a unisex barrier-free washroom is provided, a single baby change station may be provided in that location.
   - Sanitary Napkin/Tampon Dispenser: 1 coin-operated double use dispenser should be specified for each women's washroom.
   - Sanitary Napkin Disposal Units: 1 per cubicle (women's washrooms).
   - Soap Dispenser: 1 per sink, mounted over the sink, not beside it.
   - Mirrors: Specify mirrors as follows: one full-length mirror in each public washroom near enter/exit point, continuous mirror over all lavatories & counter-tops. Specify tilted, wheelchair-accessible mirrors as required by code. Mirror locations should not provide viewing into washroom from corridor or entry.
   - Grab-bars: as required by National Building Code.
   - All public washrooms should include coat hooks and shelf space on which to set personal items.
3. Refer to Part 6, Section C1031 - Toilet Partitions, and Section C1039 - Washroom Accessories.
5.20 Emergency Showers & Eye Washes (Category 16)

Section Under Development - Review w/ Workplace Safety & Environmental Protection

5.20.1 General

1. The University provides safety equipment appropriate to the risks associated with activities that occur in workplaces on campus. As the corporate health and safety representative, it is the responsibility of the Department of Workplace Safety and Environmental Protection (WSEP) to guide the University in selection, placement, installation and maintenance of safety equipment. Emergency Showers and Eyewashes are examples of safety equipment so controlled.

2. The provision of Eye Washes (EW) and Emergency Showers (ES) is driven by the Saskatchewan Occupational Health and Safety Regulations, 1996, Sections 312 and 313:

   **Emergency Showers** (SOHS Regulations, 4 Oct 96, cO-1.1 Reg 1 s312)

   “Where there may be a risk of substantial contamination of a worker or of a worker’s clothing from corrosive or other harmful substances, an employer or contractor shall provide and maintain an approved and readily accessible means of bathing or showering the worker in lukewarm water.”

   **Eye Flushing Equipment** (SOHS Regulations, 4 Oct 96 cO-1.1 Reg 1 s313)

   Where there may be a risk to the eyes of a worker from corrosive or other harmful substances, an employer or contractor shall provide, at readily accessible locations, approved equipment to flush the eyes of the worker with lukewarm water or another appropriate liquid.

3. Saskatchewan Occupational Health and Safety (SOHS) Regulation 74 defines the requirements for a regular or hygiene shower. These showers are provided to clean a worker of contamination from a regular work process. Showers for this application shall have locking doors and adjustable temperature, two items which are not supplied for an emergency shower. Rarely, if ever, will a location be equipped to serve as both.

4. Since the introduction of due diligence as the best defense following health and safety incidents, following recognized standards has become the preferred prepackaged way to ensure organizations have fulfilled their safety role. **ANSI Standard Z358.1 - 2004, Emergency Eyewash and Shower Equipment**, is well established as the standard which details the requirements of ES and EW installations. If ANSI Standard is not adhered to, a full discussion and justification of the reasons must be permanently documented.

5. EW and ES shall be ANSI Z358.1 (2004 or current) compliant. When the ANSI Standard is quoted in this document it refers to ANSI Standard Z358.1 - 2004. This may include either a Standard Requirement (e.g. 4.2) or an item from one of the appendices (e.g. B6) or explanatory information from a previous version (1990) of the Standard (e.g. E4.6.1.). Neither the appendices from the 2004 Standard nor the explanatory information from previous versions are considered to be part of the current Standard, but are included here for information purposes.

6. We do not desire to create a standard here which is to be applied to all situations in a prescriptive manner. There will be special circumstances which require deviation and decisions are to be made within the bounds of best practices and professional opinion.

8. These basic requirements must be tempered with the realization that resources are to be used to their greatest benefit across all areas and functions.

9. Exceptions to the Guidelines: There may be occasions when a design does not follow the guideline recommendations. If the Consultant wishes to deviate from the guidelines, a written request for permission shall be provided to the Client Representative for consideration by WSEP.

10. Documentation: All decisions with respect to EW/ES equipment must be fully documented. The Client Representative will copy WSEP on all correspondence, and WSEP will be responsible for ensuring those records are kept and are accessible.

5.20.2 Reference Standards


2. CFIA: Canadian Food Inspection Agency *(WSEP to add name of document)* Section 3.1.


5. Saskatchewan Occupational Health and Safety (SOHS) Act and Regulations

5.20.3 Location, Design & Dimensions

1. The SOHS Regulations state that access to eye washes and showers shall be provided under the following circumstances:

   Emergency Showers: where there is “a risk of substantial contamination of a worker or of a worker’s clothing from corrosive or other harmful substances”.

   Eye Flushing Equipment: where there is “a risk to the eyes of a worker from corrosive or other harmful substances”.

   Thus the difference in the requirements is a “risk of substantial contamination” versus just a “risk”. This indicates that a greater degree of availability should be afforded to eyewashes, which makes clear and good sense given the sensitivity of eyes to chemical damage.

   In a fixed use setting we might be able to make a distinction between which areas present the risk of substantial contamination versus non substantial contamination. In our environment of regular changes in ownership of space, type of use, degree of use and savvy of user, we have no ability to differentiate between substantial and non substantial exposure possibilities for the future. We must provide approved EW and ES units at all locations where possible contamination of eyes and/or clothing might take place. In its most general sense this means provision for both ES and EW for:

   - all wet labs,
   - all areas where corrosive or other harmful substances are or might reasonably be used,
   - areas where hazardous dusts are routinely created (seed cleaning),
• other areas as indicated by specific circumstances.

When confusion or dispute exists as to whether an area requires a unit, the final decision will rest with WSEP.

2. Proximity

SOHS Regulations require that an ES be “readily accessible”. This is interpreted within the Standard (Z358.1 - 4.5.2) as being within ten seconds (10s) travel time or 16m distance, on the same level as the hazard and with an unobstructed path from the hazard to the shower.

SOHS Regulations require that an EW be available at “readily accessible locations”. This is interpreted within the standard (Z358.1 - 6.4.2) as being within 10s travel time, on the same level as the hazard and with an unobstructed path from the hazard to the eye wash.

ANSI Standard Appendix B5 explains that closer access to both ES and EW should be afforded for especially high hazard work areas.

The previous standard (358.1(1990) - E4.6.1 or 358.1(1990) - E5.4.4) required access within 10 seconds and a maximum of 100 ft (30.5 m) travel distance from the hazard area, whichever was less. This has been relaxed in favour of a universal 10 second rule. The 10 second rule is based on the recognition that under normal circumstances, a person can travel approximately 55 feet in 10 seconds when walking at a normal pace (Appendix B5). Travel speed can be more or less based on motivation and/or physical or visual impairment and access to assistance. The 10 second rule is now the standard. There is no reason to think that our population will be any faster or slower than that which was quoted in the standard, so our objective must be to have ES and EW within 55 feet of hazardous work locations.

3. Location

Persons using ES are directed to call out for help during shower use. Required assistance can range from provision of dry clothing after rinsing to contact of emergency medical services. In order to increase the likelihood of an ES user being able to catch someone’s attention, ES should be located in frequently occupied areas wherever possible. While it is contrary to regulations and policy for people to work alone, this does not mean that persons do not work with hazardous materials in isolation, with no immediate access to help. For this reason, hallways are ideal ES locations.

4. Obstructions

Routes from the most distant place where exposure could occur to the EW/ES must be clear of obstructions. Facilities Management Division (FMD) is responsible to ensure that at the time of construction there are no permanent obstructions put in place through room design or renovation.

Occupants and/or area users are to ensure that moveable obstructions are not added during the course of area organization, reorganization or general use.

ANSI Standard Appendix B5 explains that a door is considered to be a hazard, however one door is allowed, provided it swings with the travel direction to the EW/ES and that it is always able to be opened from the hazard side without a key. It is common for lab doors to swing into the room, away from the hallway ES and opposite of the recommended characteristic. During times of especially high hazard work being performed, doors should be propped open for the duration of the special work to allow
immediate access to the ES and EW. The decision of what constitutes high hazard work
and the door position are the responsibility of the user.

5. Stairs and Ramps

The Standard states that the EW/ES shall be located on the same level as the hazard.
Stairs, steps, ramps or slopes are not permitted.

5.20.4 Flooring Materials & Finishes

2. Provide coved base to match flooring, minimum 100 mm high.
3. Slope floors to drain.

5.20.5 Wall Materials & Finishes

1. Add information.

5.20.6 HVAC

1. Refer also to Part 6, Section D30 - HVAC.
2. Add information.

5.20.7 Plumbing

1. Provide tempered water. The SOHS Regulations require “lukewarm” water to be
supplied to ES and EW units. The ANSI standard, Appendix B6, suggests 15 - 38 °C as
the maximum range. WSEP recommends the temperature be targeted to 25 ± 5 °C.
2. Floor drains should be provided for all ES except those in labs. In the event of an
accident the amount of spilled material clinging to a person, even heavily
contaminated, does not pose a significant risk if allowed to go down the sewer. If the
material is noxious in any way, directing it down the sewer is certainly more desirable
than having it spread across and through multiple floors of a building. Floor drains
installed in flat, level floors are not expected to capture a much of the water flow
during an ES use, but do make it possible for neighbouring workers to direct water to a
drain in the absence of specialized cleanup equipment. In existing lab locations where
floor drains already exist, rubber floor drain plugs or covers should be used to semi
permanently plug the drains. These can be opened when required for ES or other
legitimate water discharge. In new construction, lab floor drains should not be
installed.
3. Return Springs: Return springs are devices which close the water flow valve of an EW
or ES once the activation handle has been released. They effectively require one hand
of a user to be dedicated to keeping the water flow going during use. Return springs
are never allowed on EW units. Return springs may be allowed on ES in certain
circumstances. ANSI Standard Appendix B3 allows self closing valves in a school
laboratory situation where the enforcing authority is of the opinion that the hazard
posed is not serious. The only area where this exception will be allowed is in or near
undergraduate teaching labs, and then only after assessment and approval by WSEP.
4. Faucets with vacuum or cooling line attachments shall include back-flow protection
devices. Refer to CNSC GD-52.
5.20.8 Electrical

1. Many ES are installed such that electrical switches are in the splash zone of the shower. There is obvious potential danger for an ES user contacting an electrical circuit during shower use. Guidance here is provided by common sense and Appendix B5. Switches and other electrical devices within the splash zone must only be of approved wet application design and must be labeled as such for the information of the ES user.

2. Provide good lighting around all EW and ES.

3. Alarms: Showers located in public access areas run the risk of being activated maliciously. For this reason, public access ES should be locally and remotely alarmed. ANSI standard Appendix B4 also suggests that ES may be alarmed. When ES are alarmed they should bear signage as such. It is important that the signage accurately reflects the actions that occur when a shower is activated.

Local Alarms: Local alarms warn persons in the area of shower activation. They are typically audio, but could be visual, or both. Audible alarms should be loud enough to be heard at a reasonable distance, but not so loud that the user is coerced to shut the shower off early.

Remote Alarms: Remote alarms serve to warn the Department of Campus Safety of a shower use. This allows them to respond to shower activation and assist a legitimate user or apprehend a vandal.

ES alarms on campus are typically equipped with a multi second delay that allows monthly ES flow testing without activation of the alarm.

5.20.9 Signage

1. Signs should be clearly visible and posted in such a way that they can be seen from the greatest distance. Posting a sign flat on a wall at the station is not acceptable, since a person must be at or near the station in order to see the sign. A sign should be posted such that it is visible everywhere within the area served by the ES or EW. This typically means hanging signs from the ceiling or mounting them perpendicularly on the wall at or very near to the station. Refer to ANSI Z358.1, and SOHS Regulations.

5.20.10 Fittings, Furnishings & Millwork

1. New installations of ES should be equipped with modesty curtains, especially where the showers are hallway installations. The University should strive to supply modesty curtains on all ES.

2. Goose neck mounted eye washes are not approved per Section 5.2 - these are difficult or impossible to operate in one second or less and are not “simple to operate” in an emergency situation. Rarely do they meet the requirement of flow dispersion configuration per Section 5.3.2(3) and ANSI Standard Illustration 3c.

5.20.11 Retrofit Applications

1. Gooseneck eye washes are approved by WSEP for supplementary installation.

2. Squeeze bottle type EW are also approved by WSEP for supplementary installation. Where squeeze bottle styles are used, a local procedure must be established and
followed that ensures that the wash solution is changed at the correct frequency and that the procedures and activities are documented.

3. Drench hoses are approved for supplementary installation.
5.21 Photocopier/Printer Stations (Category 16)

5.21.1 Location, Design & Dimensions
1. ‘Photocopier/Printer Station’ refers to space allocated for photocopiers and shared/public printers in the following locations:
   • Public areas of academic buildings.
   • Public areas of libraries.
   • Common areas of academic and administrative offices.
2. Confirm requirements with Client Representative.
3. Where possible, locate photocopiers and printers in rooms separated from staff workstations and meeting rooms, or at a minimum, ensure staff workstations are not exposed to excessive noise from these machines.
4. In applications where multiple photocopiers and /or printers are housed in an enclosed area, design a segregated area with full partitions from floor to underside of structure.

5.21.2 HVAC
1. For segregated photocopier/printer rooms, specify separate outside exhaust.
2. Refer also to Part 6, Section D30 - HVAC.

5.21.3 Electrical
1. For large printers and photocopiers, specify one duplex 15/20 amp T-slot receptacle on a separate circuit for each machine.
2. Small, desktop printers do not require a separate circuit.
3. Refer also to Part 6, Section D50 - Electrical.

5.21.4 Fittings, Furnishings & Millwork
1. Specify a work counter, minimum 600 deep x 1200 long, with upper and lower storage cupboards, for stapler, hole punch, supplies, etc... Confirm dimensions with Client Representative.
5.22 Waste and Recycle Collection Points (Category 16)

5.22.1 General
1. The University has undertaken to provide central collection points in all buildings for waste and recycling.
2. These are intended for general staff and building occupant usage and should be developed with consideration and coordination of custodial staff requirements.
3. Waste and recycling containers shall be supplied and installed as part of the construction contract. Standard containers are currently under review. Please contact Client Representative for product specification.

5.22.2 Location, Design & Dimensions
1. Design dedicated locations for waste and recycling collection points, preferably in an alcove off a public corridor.
2. Specify a minimum of one waste and recycling collection point per floor in each building.
3. Each food service facility shall be provided with a waste and recycling collection point.
4. Waste and recycling collection points shall be placed in publicly accessible, visible and convenient locations. Locate waste and recycling points such that they do not impede traffic flow.
5. Waste and recycling collection points shall accommodate containers for glass, aluminum, plastic and tetrapak beverage containers, paper, and garbage. Provision for a future composting program shall also be made.
6. Coordinate waste and recycling points with Facilities Management Division, in consideration of custodial staff requirements.

5.22.3 Fittings, Furnishings & Millwork
1. Refer to Part 6, Section E1092 - Solid Waste Handling Equipment for specification of waste and recycling containers.
5.23 Mechanical & Electrical Rooms (Category 16)

5.23.1 General

1. Signage for Mechanical & Electrical Rooms shall identify room number only. Refer to signage standard, Appendix XXX.

5.23.2 Location, Design & Dimensions

1. General
   • Provide sufficient room for safe, efficient servicing of all equipment.
   • Locate equipment to allow safe, efficient servicing of all components.
   • Access to service spaces shall not be through occupied space.
   • Service rooms shall contain only building service equipment and are not to be incorporated with caretaking, grounds or other storage areas.
   • Primary elements such as pumps, fans, controls and valves should be mounted at locations and heights convenient for inspection and servicing. Raising of floor-mounted units or dropping of ceiling-hung units should be considered for efficiency of maintenance. Where convenience of location for equipment is in conflict due to space and layouts constraints, the most frequent maintenance requirement should take precedence.

2. Mechanical Rooms
   • To reduce maintenance costs and simplify emergency procedures, provide a minimum number of service rooms incorporating ventilation, heating, refrigeration, and other building services equipment. Major components should be consolidated to facilitate heat and noise control and to minimize maintenance costs.
   • Ideally, service equipment areas should be located conveniently with respect to service entrances and elevators, but should not take precedence over primary program spaces.
   • Ensure that heavy or awkward components can be moved into and out of the rooms conveniently. Allow 2400 clearance to permit equipment replacement.
   • Provide appropriate space for servicing ventilation filtering equipment and storage of at least one set of replacement filters. Where electrostatic precipitators are provided, adequate provision for cleaning should be made.

3. High Voltage Equipment Rooms
   • Locate high voltage power supply equipment indoors and at grade level if possible. If high voltage power supply equipment must be located outdoors, consider the architectural appearance of such equipment, and the provision of screening. Provide access for maintenance.
   • Specify a removable wall panel to allow removal and replacement of failed transformers.
   • Specify a service pit below high voltage switchgear.
• Main transformer(s) should be oil-filled to reduce sound transmission and facilitate future monitoring of transformer condition.
• If indoors, strong consideration should be given to the use of low flash point oil to eliminate the need for an electrical vault.

4. Low Voltage Service Entrance Room
• Locate the low voltage service entrance equipment in a room either adjacent to or above the high voltage power supply.
• Double door access directly to the outside should be provided to allow removal of failed equipment and installation of new equipment in the future.
• Building space surrounding/adjacent to this room should be such that electrical cable and conduit can be easily added in the future without major structural or mechanical obstructions.
• Locate the Emergency Generator Room adjacent to the low voltage service entrance room. One wall should be on the exterior of the building. Where the radiator is remotely mounted, this wall should be constructed with a removable panel to allow removal and replacement of the generator. Special attention should be made to adjacent building spaces which may be affected by noise, vibration and exhaust fumes during testing.

5. Electrical Closets
• Normally the building distribution shall be 600V and further stepped down to 208V for utilization. Therefore every floor, or as a minimum, every other floor should have a small electrical closet.
• Locate electrical closets centrally, to avoid long runs of large conductors.
• Provide sufficient space to accommodate two central distribution panels, a transformer and two branch circuit panels. Additional space will be required where distribution equipment from the emergency power supply is required.
• Consideration should also be given to building space adjacent to this room such that electrical cable and conduit can be easily added in the future without major structural or mechanical obstructions.

5.23.3 Flooring Materials & Finishes
1. Specify sealed concrete floors.
2. Ensure that floors slope towards floor drains where required.
3. Floors should be troughed from pump bases to floor drains in order to direct leaked water directly to the drains.
4. As spills are a common occurrence in mechanical rooms, the floor system in the room and in any plenums should be designed as a water-tight system to prevent leakage to any adjacent spaces. Confining curbs should be considered under equipment or around devices that may produce frequent leaks or spills.
5. Specify thermal and acoustic insulation below service rooms where they are situated above occupied spaces.
5.23.4 Wall Materials & Finishes
2. Walls should be painted a light colour.
3. Specify thermal and acoustic insulation in walls where service rooms adjoin occupied spaces.
4. Doors should swing outward except where prohibited by code.

5.23.5 Ceiling Materials & Finishes
1. Drop ceilings are not required.
2. Ceilings should be painted a light colour.
3. Specify thermal and acoustic insulation in ceilings where service rooms adjoin occupied spaces.

5.23.6 Doors & Windows
1. For Mechanical Rooms, High Voltage Equipment Rooms and Low Voltage Service Entrance Rooms, specify double doors with a minimum clear opening width of 2400, to permit equipment replacement.
2. For Electrical Closets, specify doors with a minimum clear opening dimension of 910mm.

5.23.7 Acoustic
1. Design service rooms to ensure a minimum Sound Transmission Class (STC) rating of 55.

5.23.8 HVAC
1. Design indoor temperature to xx deg.C - xx deg. C.
2. Specify adequate ventilation to eliminate any gases released from transformers and eliminate heat dissipated from equipment.
3. Consider the provision of independent ventilation systems to prevent heat accumulation during periods of system shut down.
4. Emergency generators shall be provided with dedicated combustion air dampers.
5. Refer also to Part 6, Section D30 - HVAC.

5.23.9 Plumbing
1. Specify floor drains in all mechanical rooms, and under all air handling units, chillers and pumps.
2. In mechanical rooms, specify a large service sink with a faucet, near the work bench.

5.23.10 Electrical
1. In electrical rooms, generally half the lighting and power receptacles should be supplied from the emergency power supply, the other half from normal power supply. Lighting should be manually switched on/off.

2. Service rooms should be well illuminated in areas where servicing will be required. Emergency lighting and receptacles should be adjacent to equipment on emergency power. Lighting should be manually switched on/off.

3. Provide locally switched compact fluorescent lighting in mechanical duct systems at filter locations and near mechanical units where frequent maintenance will occur.

4. Specify a battery powered lighting unit in the Emergency Generator Room.

5. Specify restricted power master keying for high voltage equipment rooms, the cylinder to be provided and installed by the University.

6. Specify a “high voltage” warning sign on the door of all rooms containing high voltage equipment.

7. In mechanical rooms, specify a 208 volt, single phase, 40 amp, welder outlet, at the work bench.

5.23.11 Communications & Data

1. Specify data 1 connection point in each service room. (Confirm)

2. Specify 1 telephone connection point in each service room.

5.23.12 Fittings, Furnishings & Millwork

1. In mechanical equipment rooms, specify a portable, sturdy, narrow work bench and a small amount of free space for servicing.
5.24 Communications Closets (Category 16)

5.24.1 General
1. Signage for Communications Closets shall identify room number only. Refer to signage standard, Appendix XXX.

5.24.2 Location, Design & Dimensions
1. Provide a communication termination closet of 600 deep x 1500 long with double doors with no mullion for every 1000 NASM (net area - square metres) of Building area.
2. Provide a smaller closet of 600 deep x 900 long for b smaller than a 1000 NASM.
3. The closets should be located directly off hallways or other serviceable areas, have access to the ceiling space above and the floor below.
4. The size and location of closets is to be determined in cooperation with the University of Saskatchewan.
5. The primary communications distribution system shall be cable tray originating at the closet and running the length of the corridors. Provide four 100mm conduits between closets on different floors.

5.24.3 Flooring Materials & Finishes

5.24.4 Wall Materials & Finishes

5.24.5 Ceiling Materials & Finishes
1. No drop ceilings are required.

5.24.6 HVAC
1. Provide adequate ventilation to eliminate heat dissipated from equipment.
2. Refer also to Part 6, Section D30 - HVAC.

5.24.7 Electrical
1. Provide occupancy sensor with manual on.
2. Provide distribution receptacles as required.
5.25 Custodial Lounge (Category 16)

5.25.1 General
1. The ‘Custodial Lounge’ is a staff lounge for the caretaking staff assigned to a particular Building.
2. Provide one ‘Caretakers’ Room’ for each Building, sized according to the size of the caretaker crew, and separated from the Custodial Supply Room.

5.25.2 Location, Design & Dimensions
1. Locate Custodial Lounge close to the service entrance, and the Custodial Supply Room.
2. Custodial Lounge should have immediate access to the main circulation system of the Building.
3. Traffic to it will be relatively frequent at night, but duration of occupancy will be short.
4. Refer to Appendix XXX for a typical layout of a Custodial Lounge.
5. Size of caretaker crew is determined as follows: net floor area / 2000 s.m. = # of caretakers assigned to building.
6. Personnel Area: Provide a personnel area,
7. Personnel Area should include a locker-change-washing unit and a lunch space.

5.25.3 Flooring Materials & Finishes
2. Provide coved rubber base.

5.25.4 Wall Materials & Finishes
1. Acceptable wall finishes: painted gypsum wall board, sealed or painted concrete, sealed or painted concrete block, ceramic tile.
2. Where GWB is used in areas prone to wetting, specify moisture resistant type.

5.25.5 Ceiling Materials & Finishes
1. Acceptable ceiling finishes: suspended acoustic ceiling tile system.

5.25.6 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add information.

5.25.7 Plumbing
1. Specify a dual-bowl kitchen sink for the kitchenette.
2. Consider the provision of shower stalls.

5.25.8 Electrical

1. Provide occupancy sensor with manual on.
2. Specify a split-wired 15 amp duplex receptacle above the kitchenette counter.
3. Specify a 15 amp duplex receptacle for refrigerator.
4. Refer also to Part 6, Section D50 - Electrical.

5.25.9 Communications & Data

1. Provide data connection point(s). Number of lines to be specified in the Program of Requirements.
2. Provide 1 telephone connection point.

5.25.10 Fittings, Furnishings & Millwork

1. Provide one 300 x 500 x 1500 locker per caretaker.
2. Provide lunch space with a table and chair seating for the maximum occupancy.
3. Provide a kitchenette counter with a small kitchen sink, cupboards for supplies, and an area for a fridge.
4. Provide two small tackboards, one immediately outside the door for messages, and one inside for posting orders.
5.26 Custodial Supply Room (Category 16)

5.26.1 General
1. The ‘Custodial Supply Room’ is a bulk storage room for cleaning supplies and cleaning equipment.
2. Provide a minimum of one Custodial Supply Room for each Building, or more as required, depending on the Building size. The number and size of the Custodial Supply Room shall be determined by the Client Representative in consultation with FMD’s Associate Director of Building Services.

5.26.2 Location, Design & Dimensions
1. Locate Custodial Supply Room close to the service entrance, to facilitate handling supplies.
2. Custodial Supply Room should have immediate access to the main circulation system for the Building.
3. Bulk Storage: Provide an area of 1.0 s.m. per caretaker for bulk storage of case supplies. (Refer to millwork requirements below.)
4. Equipment Storage: Provide 1.5 s.m. for special cleaning equipment, stepladders and supplies.
5. Comply with National Building Code requirements for fire separations.

5.26.3 Flooring Materials & Finishes
2. Linoleum is not approved for use in Custodial Supply Rooms.
3. Provide coved rubber base.

5.26.4 Wall Materials & Finishes
1. Acceptable wall finishes: painted gypsum wall board, sealed or painted concrete, sealed or painted concrete block.
2. Where GWB is used in areas prone to wetting, specify moisture resistant type.

5.26.5 Ceiling Materials & Finishes
1. Ceilings are not normally required.
2. Where ceilings are required, provide suspended acoustic ceiling tile system.

5.26.6 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add information.
5.26.7 Plumbing
1. *Add information.*

5.26.8 Electrical
1. Provide occupancy sensor with manual on.
2. Provide a 15/20 amp T-slot amp duplex receptacle on a separate circuit in the Bulk Storage/Equipment Storage area.
3. Refer also to Part 6, Section D50 - Electrical.

5.26.9 Fittings, Furnishings & Millwork
1. Specify adjustable wall-mounted shelving.
2. Specify a cupboard storage unit approximately 2000 high with 300 deep shelving above a 600 deep cupboard for smaller quantities of cleaning solutions.
5.27 Custodial Closet (Category 16)

5.27.1 Location, Design & Dimensions
1. Provide at least one Custodial Closet for each custodial “territory”, and a minimum of one Custodial Closet for each Building.
2. Distribute Custodial Closets such that there is at least one closet per floor.
3. Ideally, Custodial Closets should be situated near washrooms, near stairs or elevators and central to the assigned territory.
4. Provide clear floor space just inside the door to one side for holding equipment. This area should be about 1600 x 2000 and include a 15/20 amp T-slot receptacle on a separate circuit.
5. In buildings larger than 10,000 square metres, one of the caretaker closets, preferably in the lower part of the building and near an elevator, should be enlarged slightly to serve as the recharging station for a battery powered floor scrubber. The room would not be occupied during the charging operation; hence, the additional floor area requirement is minimal, depending on the layout. Approximate dimensions of the machine are 860 wide x 1650 long x 990 high. The room should be exhausted directly to atmosphere by an independent, explosion-proof system to remove the charging fumes (Hydrogen). A 15 amp electrical circuit is required for the charger.

5.27.2 Flooring Materials & Finishes
2. Linoleum and resilient tile are not approved for use in Custodial Closets.
3. Provide coved base to match flooring.

5.27.3 Wall Materials & Finishes
1. Provide stainless steel wall protection on all wall surfaces immediately adjacent to the mop sink.
2. Provide all other lower wall surfaces with a protective thermoplastic wall protection sheet covering.

5.27.4 Ceiling Materials & Finishes
1. Ceilings are not normally required.
2. Where ceilings are required, provide suspended acoustic ceiling tile system.

5.27.5 Doors & Windows
1. Provide doors with a minimum clear opening dimension of 910mm.

5.27.6 HVAC
1. Custodial Closets should be properly ventilated by exhausting air through the room. An exhaust rate of at least 10 l/s per square metre should be provided.

2. For Custodial Closets equipped to charge battery-powered floor polishers, provide an independent, explosion-proof system to exhaust the charging fumes (hydrogen) directly to atmosphere.

3. Refer also to Part 6, Section D30 - HVAC.

5.27.7 Plumbing
1. Provide a floor-level mop sink.
2. A floor drain is not required.

5.27.8 Electrical
1. Provide occupancy sensor with manual on.
2. For safety reasons, light fixtures should not be located directly over mop sinks to avoid lamp breakage by mop handles.
3. For Custodial Closets equipped to charge battery-powered floor polishers, provide a 15/20 amp T-slot GFCI receptacle.
4. Refer also to Part 6, Section D50 - Electrical.

5.27.9 Fittings, Furnishings & Millwork
1. Provide about 1500 linear mm of shelving, for the stocks of paper towels, toilet tissue, soap, waxes, detergents, polishes, new and burned-out lamps.
2. Provide a mop and broom hanging rail, with a minimum of six broom clips.
3. Provide space for horizontal storage of replacement fluorescent lamps.
4. Provide tackboards near the door both inside and outside.
5.28 Grounds Room (Category 16)

5.28.1 General

1. ‘Grounds Room’ refers to a room for the storage of supplies and equipment used by grounds keepers.

2. The campus grounds are divided into zones for maintenance purposes. If one is not already provided within the zone, or if the new Building will create a new zone, a Grounds Room will be required. Consult with the Client Representative to determine if this will be a requirement for a particular Project.

5.28.2 Location, Design & Dimensions

1. The Grounds Room should be accessible from outside, directly from grade level, and preferably from the service entry roadway. The room, although contained within a Building, has no relationship with academic operations or building services.

2. Provide about eight square metres of floor area, a size sufficient for smaller power units, hand tools, hose sprinklers and small quantities of fertilizers & pesticides.

3. Oil and gasoline required by the zone crew in its day-to-day operations shall be stored at an alternate fire-safe location.

5.28.3 Flooring Materials & Finishes


5.28.4 Wall Materials & Finishes

1. Provide unpainted concrete block walls.

5.28.5 Ceiling Materials & Finishes

1. No drop ceiling is required.

5.28.6 Doors & Windows

1. Provide doors with a minimum clear opening dimension of 1200 mm with a sill designed for easy passage of power mowers.

2. The lock should not be keyed to the rest of the Building - the University will provide the cylinder.

5.28.7 HVAC

1. Provide direct ventilation to the outside.

2. Refer also to Part 6, Section D30 - HVAC.

5.28.8 Plumbing
1. No plumbing is required.

5.28.9 Electrical
1. Provide a single explosion-proof light fixture and switch.
2. No power outlets are required.

5.28.10 Fittings, Furnishings & Millwork
1. No furnishings are required as the University will supply and install the shelves, racks and hooks.
5.29 Bicycle Storage Room (Category 16)

5.29.1 General

1. **For Consideration:** Provide secure bicycle storage for 5% of regular building occupants, unless otherwise directed by *Facilities Management Division*.

5.29.2 Location, Design & Dimensions

1. The Bicycle Storage Room should be accessible directly from the outside, either at grade or basement level, and should also be provided with access to the building interior.

2. Provide area sufficient for 5% of regular building occupants.

3. Locate change & shower rooms nearby.

5.29.3 Flooring Materials & Finishes


5.29.4 Wall Materials & Finishes

1. Provide unpainted concrete block walls.

5.29.5 Ceiling Materials & Finishes

1. No drop ceiling is required.

5.29.6 Doors & Windows

1. Provide doors with a minimum clear opening dimension of 910mm.

5.29.7 HVAC

1. Refer to Part 6, Section D30 - HVAC.

5.29.8 Plumbing

1. No plumbing is required.

5.29.9 Electrical

1. Provide occupancy sensor with manual on.

2. Provide 15/20 amp T-slot GFCI receptacles.

3. Refer also to Part 6, Section D50 - Electrical.
5.29.10  Fittings, Furnishings & Millwork
1. Provide wall or floor-mounted bicycle racks.
5.30 Residential Space (Category 17)

Section Under Development

5.30.1 General
1. ‘Residential Space’ refers to rooms used for the residential accommodation of students, and the ancillary areas in support of such rooms. Included in this category are student residence rooms, as well as laundry rooms, recreational rooms, music rooms, games rooms, locker rooms and lounges associated with a residence facility.

5.30.2 Location, Design & Dimensions

5.30.3 Flooring Materials & Finishes

5.30.4 Wall Materials & Finishes

5.30.5 Ceiling Materials & Finishes

5.30.6 Doors & Windows

5.30.7 Acoustic

5.30.8 HVAC

5.30.9 Plumbing

5.30.10 Electrical

5.30.11 Communications

5.30.12 Fittings, Furnishings & Millwork
5.31 Animal Space (Category 18)

Section Under Development - Review w/ WSEP

5.31.1 General

1. ‘Animal space’ or ‘animal facilities’ refers to animal holding facilities forming part of laboratory, teaching and research facilities. The requirements listed below do not apply to the University’s farm buildings.

2. A ‘Small Animal Facility (SAF) Zone’ is defined as an area of equal containment level. An “animal room” is defined as the room in which the small animal is housed. The containment perimeter/barrier of the small animal facility zone is continuous and non-intersecting (i.e. the zone is serviced by a single entry/exit).

3. Animal rooms for small animals should be designed for ease of cleaning and disinfection and have a minimum of built-in equipment. The design of the animal facility should permit adjustment of environmental controls to meet the needs of the species as specified by the Canadian Council for Animal Care Guide to the Care and Use of Experimental Animals, 1993.

4. A ‘Large Animal Facility (LAF) Zone’ is defined as an area of equal containment level. A ‘cubicle’ is defined as the room in which the large animal (LA) is housed. The containment perimeter/barrier of the LA facility zone is continuous and non-intersecting (i.e. the zone is serviced by a single entry/exit).

5. Animal cubicles must be constructed to contain large numbers of microorganisms which may be present. Unlike a laboratory room where the biological safety cabinet provides primary containment, the animal cubicle serves as both the primary and secondary barrier. A “clean and dirty” (i.e. entry and exit) corridor concept is operationally preferable to a “single” corridor design. The clean and dirty corridor facilitates the traffic flow of animal handlers, scientific staff, animals, feed, equipment and samples. This design also minimizes the risks of cross-contamination between animal rooms.

6. During the Design Development Phase, and again during the Construction Documentation Phase, at 60% and 99% completion, drawings for laboratories and animal facilities shall be provided by the Consultant to FMD - Workplace Safety and Environmental Protection (WSEP) to review for occupational hazards. A thorough and complete review of activities to be conducted in the work area will be completed. WSEP staff will determine the hazard classification of each laboratory, and will refer designers to appropriate regulations, standards or guidelines for each area as required.

7. The University is committed to maintain all laboratory and research facilities to a minimum nuclear substance level II and/or biocontainment level II laboratory standards. Any alternate laboratory classification must be approved by Workplace Safety and Environmental Protection (WSEP). For the classification of an existing laboratory space, please contact WSEP.

8. All animal facilities on campus must meet the following design criteria for health, safety and environmental aspects. Do not modify or amend any existing facility to less than the following standards.

5.31.2 Reference Standards
(WSEP to review & confirm whether all these standards apply to animal facilities)

1. Animal facilities shall conform to the most recent edition of the following regulations, standards, & guidelines, as applicable:
5.31.3 Location, Design & Dimensions

1. Small Animal Facilities (SAF) and Large Animal Facilities (LAF) shall be separated from other laboratory activities. Refer to CFIA Section 3.2 & 3.3.

2. Perimeter doors to the laboratory shall be lockable so that only authorized persons have access. Card access system preferred.

3. Office areas shall be located outside of the SAF or LAF zone. Refer to CFIA Section 3.2 & 3.3.

4. Clerical work areas for animal handlers are permitted within SAF or LAF zone but outside of animal rooms and corridors. Refer to CFIA Section 3.2 & 3.3.

5. Feed and bedding storage areas shall be provided within the SAF. Refer to CFIA Section 3.2.

6. Storage areas for short-term storage of small amounts of feed shall be provided within the LAF. Refer to CFIA Section 3.3.

7. Clean and dirty cage washing area shall be provided within the SAF. Refer to CFIA Section 3.2.

8. Experimental areas (i.e. necropsy, surgical procedures, etc.) shall be separate from animal rooms. Refer to CFIA Section 3.2.
9. A post mortem room, if required, should be provided within the LAF zone. The post mortem room shall be provided with an integral cold room for storage of LA carcasses awaiting necropsy or disposal and a laboratory support area. Refer to CFIA Section 3.3.

10. Dedicated and controlled access to be limited to authorized personnel into the SAF or LAF zone. Refer to CFIA Section 3.2 & 3.3.

11. Entry to SAF or LAF zone to be provided with clothing change area designed to separate personal clothing from SAF clothing dedicated to that zone. Refer to CFIA Section 3.2 & 3.3.

12. Combustible and flammable liquids shall be kept in receptacles that meet the requirements of the *National Fire Code of Canada 1990*. Refer to SOHS 365.

13. Self-contained enclosures, rooms, or buildings that are isolated from work-related areas and worksites used to store flammable, oxidizing, corrosive, toxic, or dangerously reactive chemicals shall be adequately vented. These areas should also be protected from conditions including excessive temperature, shock or vibration that could reduce the stability or increase the potential hazards of the substance. Refer to SOHS 314.

14. Design for at least 10 cubic meters of space for each worker employed at any one time at a work site. No space that is more than three meters from the floor and no space occupied by solid objects is to be taken into account. Refer to CNSC GD-52 and SOHS Section 68.

5.31.4 Flooring Materials & Finishes

1. Flooring shall be impervious, chemical resistant, and washable, as per CNSC GD-52.

2. Floor surfaces shall maintain adherence and integrity under high pressure washing stresses (i.e. 90°C @ 150 psi). Refer to CFIA Section 3.3.

3. Floors shall be slip resistant. Refer to CFIA Section 3.1.

4. Acceptable flooring materials: seamless epoxy, chemical-resistant resilient sheet flooring. Sealed or polished concrete may be used for some research laboratories. Confirm with Client Representative. Consultants shall ensure that the specified flooring material is resistant to damage from the particular functions expected in each facility. All joints in the flooring material shall be sealed, as per CNSC GD-52.

5. Consider the movement of equipment carts, in the selection of flooring materials and transitions.

6. Sub-floor to be concrete.

7. Animal cubicle, corridor and post mortem room floors to slope towards floor drain (recommended slope is 2%) Refer to CFIA Section 3.3.

5.31.5 Wall Materials & Finishes

1. Acceptable wall finishes: ceramic tile, painted concrete, painted concrete block, thermoplastic wall protection sheet. Paint finishes shall be a smooth satin finish, non-absorbent and washable. Joints shall be sealed where applicable. Other materials may be considered provided they will withstand expected conditions. Refer to CSNC GD-52.

2. Wall surfaces shall maintain adherence and integrity under high pressure washing stresses (i.e. 90°C @ 150 psi). Refer to CFIA Section 3.3.
3. Ensure that animal holding facilities are acoustically isolated from adjacent spaces. Walls shall be constructed to underside of structure, to isolate sound. Seal junction between wall and structural deck or slab. Seal all penetrations.

4. Continuity of seal shall be maintained between the floor and wall (a cove floor finish 1000 mm up the cubicle, dirty corridor and post mortem room wall is recommended). Refer to CFIA Section 3.3.

5. Ensure that animal spaces are acoustically isolated from adjacent spaces.

6. Protruding obstructions to be minimized in animal cubicles and corridors; to protect animals, unguarded projections shall be at a height of at least 2130 mm. Refer to CFIA Section 3.3.

7. Specify corner guards.

8. Walls shall be constructed to the underside of structure.

5.31.6 Ceiling Materials & Finishes

1. Acceptable ceiling materials: painted moisture-resistant gypsum wall board, suspended acoustic ceiling tile.

2. Consider omitting ceiling materials from research laboratories where appropriate.

3. Acoustic ceiling tile system shall conform to standard ceiling tile specification for wet labs - refer to Part 6, Section C3031 - Suspended Acoustic Ceiling Tile Systems.

4. Suspension system to be humidity, corrosion and chemical resistant.

5. Acoustic ceiling tile systems shall conform to standard ceiling tile specification for wet labs - refer to Part 6, Section C3031 - Suspended Acoustic Ceiling Tile Systems.

5.31.7 Doors & Windows

1. Doors & frames shall be painted steel, stainless steel, safety glass or other robust, non-absorptive material (wood is not acceptable), as per PHAC Section 4.2

2. Entry to the SAF or LAF zone shall be provided via ventilated airlock (i.e. ventilation to be provided through leaky doors and/or HVAC systems). Refer to CFIA Section 3.2 7 3.3.

3. Size of door openings shall allow passage of all anticipated equipment and animals. (PHAC section 4.1) At a minimum, specify doors with a minimum clear opening dimension of 910mm. For larger rooms, double doors are preferred, each leaf minimum 910mm.

4. Specify a minimum of two (2) exits for spaces larger than 200 s.m.

5. Doors shall be finished with a satin paint, non-absorbent and washable.

6. Perimeter doors to the animal space shall be lockable so that only authorized persons have access. Card access system preferred. Comply with CNSC GD-52, PHAC Section 4.1, CFIA Section 4.1.1

7. If the premise utilizes card access, recommend installing a card reader for access control, per CNSC Security Standard).

8. All door lites or large vents (grills) shall be fitted with security glazing or bars, metal grill, etc., as per CNSC Security Standard.
9. Space to mount appropriate signage should be provided near door. (e.g. designation of facility, safety precautions required prior to entry, etc.), as per CNSC RP Section 21, PHAC Section 4.1.

10. Specify automatic door closers on all perimeter doors. Perimetre doors are required to be kept closed at all times, as per CFIA Section 3.1.

11. Windows with direct access between outside the LAF and cubicles/post mortem room not to be provided; viewing windows into cubicles acceptable. Refer to CFIA Section 3.3.

12. Windows, if operable, shall be protected by fly screens, as per PHAC Section 4.4.

13. Windows on ground floor shall provide adequate level of security to prevent unauthorized access to the area, as per CFIA Section 3.1 and CNSC Security Standard.

14. Window design shall be integrated with the HVAC system to avoid condensation, wetting and/or frost build-up as per CFIA Section 3.1.

15. Windows shall be placed a minimum of 1800 mm above finished floor.

16. Animal holding zone shall be proofed against entry or exit of vermin or insects, as per CFIA Section 3.1.

5.31.8 Acoustic
1. Design animal holding facilities to ensure a minimum Sound Transmission Class (STC) rating of 50.

5.31.9 HVAC
1. Animal holding facilities shall be at negative pressure with respect to surrounding areas. Non recirculated air should be supplied. Refer to CNSC GD-52, PHAC Section 4.3, and CFIA Section 3.1

2. HVAC from animal cubicles to provide specified number of air changes as required by the CCAC and to minimize dead air spaces within the cubicle; supply and exhaust diffusers to be located to provide convention patterns that ensure airflow away form room entrance; diffuser selection to provide minimal throw velocities (i.e. <15 m/m @ 1m). Refer to CFIA Section 3.3.

3. Refer also to Part 6, Section D30 - HVAC.

5.31.10 Plumbing
1. Exposed services piping with stand-offs shall be designed to provide access for maintenance and cleaning. Refer to CFIA Section 3.3.

2. Specify an Emergency Shower in each animal facility where there is “a risk of substantial contamination of a worker or of a worker’s clothing from corrosive or other harmful substances”. Readily accessible means accessible within 10 seconds or 16 meters anywhere in the risk area. Refer to Part 5, Section 5.24 - ‘Emergency Showers & Eye Washes’. Refer also to ANSI Z358.1, PHAC Section 4.5, CFIA Section 3.1, CNSC GD-52, and SOHS Guideline.

3. Specify an eye flush in each animal facility where there is “a risk to the eyes of a worker from corrosive or other harmful substances”. Readily accessible means accessible within 10 seconds or 16 meters anywhere in the risk area. Refer to Part 5,
Section 5.24 – ‘Emergency Showers & Eye Washes’. Refer also to ANSI Z358.1, PHAC Section 4.5, CFIA Section 3.1, CNSC GD-52, and SOHS Guideline.

4. Locate a hand washing sink near the animal facility exit. The hand washing sink shall be provided with a ‘hands free’ faucet. The hand washing sink shall be separate from the wash-up/disposal sink in the lab. Sink drain traps shall be accessible. Refer to CNSC GD-52 and PHAC Section 4.5.

5. Specify drains to be constructed of chemical-resistant material. Refer to CNSC GD-52.

6. Specify a backflow protection device to prevent potentially contaminated effluent from entering the public water system. Refer to CNSC GD-52.

7. Drain traps shall be provided at depth in accordance with pressure differentials (i.e. to maintain water seal); 15 cm P-traps are recommended. Refer to CFIA Section 3.3.

8. Specify sinks made of a material that is readily cleanable. Refer to CNSC GD-52.

9. Sinks shall have overflow outlets. Refer to CNSC GD-52.

10. Specify floor drains.

11. Specify cage washers with temperature of final rinse water to be at least 82°C.

12. Emergency natural gas shut-off valves shall be located outside the animal facility.

13. Proven technologies for sterilization shall be provided within LAF zone. Refer to CFIA Section 3.3.

5.31.11 Electrical

1. Provide emergency lighting as required by the NBC. Emergency lighting in labs should be switched but provided with a relay to come on in the event of a power failure. Refer to CNSC GD-52.

2. Provide emergency power to critical items such as biological safety cabinets, fume hoods, freezers, emergency lighting, etc. Refer to CFIA Section 3.1 and CNSC GD-52.

3. Light ballasts shall be on a separate distribution layout from the normal or emergency power to minimize harmonic current problems for sensitive lab equipment. Refer to CFIA Sections 3.2 & 3.3.

4. High Intensity Discharge (HID) lamps with lengthy re-strike times should be avoided where there is no alternate quick strike light source. Refer to CFIA Sections 3.2 & 3.3.

5. Refer also to Part 6, Section D50 - Electrical.

5.31.12 Fire Protection

1. Provide portable fire extinguishers in compliance with the requirements of NFPA 10 - ‘Standard for Portable Fire Extinguishers’, and WSEP requirements.

5.31.13 Fittings, Furnishings & Millwork

1. Biosafety cabinets, if required, shall be installed in experimental areas only.

2. Biohazard cabinets (or Biosafety cabinets) shall comply with NSF/ANSI 49-2010, Biosafety Cabinetry: Design, Construction, Performance, and Field Certification, for Class II Biohazard Cabinetry. All such installations must be approved at both the design stage and following installation by the Biosafety Manager of the University’s Department of Workplace Safety and Environmental Protection (WSEP).
3. Cupboards and shelving, including hardware shall be smooth, impervious, chemical-resistant and washable, as per CNSC GD-52.

4. Drawers to be equipped with catches, to prevent the drawer from being pulled out of the cabinet. Refer to CFIA Section 3.5.

5. Reagent shelving to be equipped with lip edges or some other method to prevent migration of substances off the shelf. Refer to CFIA Section 3.5.

6. Work surfaces shall be smooth, impervious, chemical, heat, scratch, and impact resistant. If joint required, joint must be sealed, as per CNSC GD-52 and PHAC Section 4.2.

7. Laminar flow clean air devices, such as clean benches, shall comply with the Institute of Environmental Sciences (IES) standard IES-RP-CC002.

8. Arrange furnishings to allow easy access to an exit.

9. Specify 25mm thick epoxy resin counters & benchtops where required. Counters & benchtops shall include a lip to prevent run-off onto the floor. If the countertop buts a wall, it shall either be coved or have a back-splash against the wall, as per CNSC GD-52 and PHAC Section 4.2.

10. Specify chemical-resistant storage trays inside storage cabinets, to contain spills.

11. Specify hand soap dispensers and paper towel dispensers.

12. Specify hooks to be provided within the room, close to the room exit, for removal of laboratory coats. Refer to PHAC Section 4.5 and CNSC GD-52.

5.31.14 Equipment

1. Refer to requirements listed under Section 5.3 - Instructional & Research Laboratory Spaces (Categories 02 & 03).
5.32 Parking Structures (Category 19)

Section Under Development.

5.32.1 General

5.32.2 Location, Design & Dimensions
1. Provide good sight lines, and avoid creating areas of potential entrapment.

5.32.3 Flooring Materials & Finishes
1. Add Information

5.32.4 Wall Materials & Finishes
1. Add Information

5.32.5 Doors & Windows
1. Add Information

5.32.6 HVAC
1. Refer also to Part 6, Section D30 - HVAC.
2. Add Information.

5.32.7 Plumbing

5.32.8 Electrical
1. Provide lighting levels and coverage sufficient to avoid contrast between light and shadow, to reduce potential for entrapment.
2. Provide zoned, switched lighting. Occupancy sensors may be provided in suitable locations. Photocell control should only be provided if a sufficient quantity of fixtures will be affected. Control should be on/off.
3. In parking structures, provide sufficient lighting on emergency power to allow for safe evacuation.
4. Refer also to Part 6, Section D50 - Electrical.

5.32.9 Communications & Data
1. In parking structures, provide one emergency telephone station per floor, in a visible location.
5.32.10  Fittings, Furnishings & Millwork

1.  *Add Information*
6.0 Assemblies and Systems

6.1 General

6.1.1 Part 6.0 of the Design Manual specifies the requirements to be met in designing the building assemblies, systems and services. The information contained in this Part has been organized according to the UniFormat II™ classification system. The UniFormat II™ system employs a hierarchical structure to describe building elements and related sitework. Elements, as defined by this standard, are major components, assemblies or systems common to most buildings. UniFormat II™ employs four levels of classification, described as Levels 1, 2, 3 & 4.

6.1.2 This Manual employs all of the UniFormat II™ Level 1 categories, which are as follows:

- **A** Substructure
- **B** Shell
- **C** Interiors
- **D** Services
- **E** Equipment & Furnishings
- **F** Special Construction & Demolition
- **G** Building Sitework

The Manual also follows the Level 2 classifications, for example, “A10 Foundations”. Level 3 and 4 classifications are employed where necessary.

6.1.1 The intent of this Part of the Manual is to identify systems, materials and products that have a proven track record at the University, and that are approved for use. It is not the intent of the Manual to restrict innovation or limit creativity in design. Consultants are therefore encouraged to propose alternate systems, materials and products where he or she feels such alternatives are warranted.

6.1.2 This Part of the Manual is not intended to function as a specification, but is intended to be used by the Consultant in the development of his or her specifications. Responsibility for design rests with the Consultant. If the Consultant disagrees with any of the requirements or recommendations of this Manual, he or she shall notify Facilities Management Division during the design process, so that a solution acceptable to all parties may be agreed upon.

6.1.3 The reference standards referred to in this Part of the Manual are not meant to constitute a complete list of standards relating to the products and materials in question. Final responsibility for the completeness of project specifications rest with the Consultant.

6.1.4 Where reference standards are referred to in this document, they shall be taken to refer to the most recent edition of the standard, or its successor.
6.2 Technical Guidelines

A. Substructure

A10 Foundations

A1010 Standard Foundations

1. General Requirements
   • Information on soils and foundation design recommendations will be made available by the University to the Consultant in the form of a Geotechnical Consultant’s report. However the Consultant is cautioned that the sub-strata in the district are quite variable. Historically, test borings have not necessarily covered the full range in water table elevation or located all the sand lenses within the site.

2. Reference Standards
   • Concrete foundations (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     ▪ ACI 305R - Hot Weather Concreting.
     ▪ ACI 306R - Cold Weather Concreting.
     ▪ ASTM C260 - Air-Entraining Admixtures for Concrete.
     ▪ ASTM C330 - Lightweight Aggregates for Structural Concrete.
     ▪ ASTM C494/C494M - Chemical Admixtures for Concrete.
     ▪ ASTM C1017/C 1017M - Chemical Admixtures for Use in Producing Flowing Concrete.
     ▪ ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
     ▪ ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
     ▪ ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
     ▪ CAN/CSA A438 - Concrete Construction for Houses and Small Buildings.
     ▪ CAN/CSA A3000 - Cementitious Materials Compendium.
     ▪ CSA A23.1-04/A23.2 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.
     ▪ CSA A23.3 - Design of Concrete Structures.
     ▪ CSA S269.1 - Falsework for Construction Purposes.
     ▪ CAN/CSA S269.3 - Concrete Formwork.
     ▪ CAN/CSA S413 - Parking Structures.
     ▪ CSA S474 - Concrete Structures.
3. Design & Execution

- Foundation designs shall be site-specific, and based on a current geotechnical report.
- All concrete in contact with subsoils shall be designed to be resistant to sulphates in ground waters and soils. Pile size and method of placement shall be designed to augment sulphate resistance.
- All concrete shall be designed to meet the structural requirements of the application, but with a minimum 28 day compressive strength of 25 Mpa. The cement aggregate ratio of concrete in contact with the soil shall be not less than 1:5.
- Consideration shall be given to the specification of high-volume fly ash concrete.
- There are to be no construction joints, as distinct from design joints, in any concrete walls below grade.
A1013 Perimeter Drainage & Insulation

1. General Requirements
   • Full perimeter drainage shall be provided around all foundation walls at footing level, connected to the storm sewer.
   • Continuous interior underslab drainage shall be provided where soil conditions warrant.
   • Foundation walls shall be insulated on the exterior, to minimize the effects of freeze-thaw cycles on the foundations, and to place the maximum thermal mass inside the insulated envelope.
   • Insulation levels may vary from project to project depending on the building type and required energy performance characteristics. At a minimum, provide an effective insulation level of RSI 3.5 (R20) for exterior foundation walls below grade, and RSI 1.4 (R8) under concrete slabs on grade.

2. Reference Standards
   ▪ Perimeter insulation materials & installations shall conform to the most recent edition of the following standards, as applicable:
     ▪ ASTM C578 - Rigid Cellular Polystyrene Thermal Insulation.
     ▪ ASTM C612 - Mineral Fibre Block and Board Thermal Insulation.
     ▪ ASTM C1126 - Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
     ▪ ASTM D2729 - Poly (VinylChloride) (PVC) Sewer Pipe and Fittings.
     ▪ CAN/ULC-S701 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.
     ▪ CAN/ULC-S702 - Thermal Insulation, Mineral Fibre, for Buildings.
     ▪ CAN/ULC-S704 - Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

3. Products
   • Perimeter insulation - acceptable products include:
     ▪ Extruded or expanded polystyrene board, Type 4, ship-lapped edges, to CAN/ULC-S701.
     ▪ Rigid mineral wool insulation board, designed as a foundation drainage system to CAN/ULC-S702. Roxul Drainboard or approved equivalent.
   ▪ Perimeter drainage - corrugated plastic tubing, flexible type, diameter as required for design conditions. Use perforated pipe at subdrainage system, unperforated through sleeved walls.
   ▪ Drainage/Protection Board: three-dimensional polymeric core drainage board with filter fabric facing layer. Bakor DB 6200 or approved equivalent.

4. Design & Execution
• Foundation wall insulation shall extend from the top of the foundation wall to the top of the footing.
• Insulation may be fastened either mechanically or using adhesive. Follow manufacturer’s recommendations.
• Ensure compatibility of all components of the foundation waterproofing and insulation, including waterproofing membranes, primers, adhesives and insulation materials.
• Provide drainage/protection board to insulation below grade.
• Exposed (above-grade) portions of foundation wall insulation shall be protected from mechanical and UV damage by a layer of parged cement board, stone veneer, precast concrete, or other durable material. Details to be approved by Client Representative.
• Install perimeter drainage in a filter fabric sleeve.
• Install drainage aggregate at sides, underside and top of pipe. Provide top cover compacted thickness of 300 mm.
A1014 Foundation Water-proofing

1. General Requirements
   • Foundation walls shall be provided with a waterproofing membrane extending from the top of the foundation wall to the top of the footing.

2. Reference Standards
   • Foundation water-proofing materials & installations shall conform to the most recent edition of the following standards, as applicable:
     • ASTM C836 - High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use With Separate Wearing Course.
     • CAN/CGSB-37.16 - Filled, Cutback Asphalt for Damp-proofing and Waterproofing.
     • CAN/CGSB-37.2 - Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Damp-proofing and Waterproofing and for Roof Coatings.
     • CAN/CGSB 37.3 - Application of Emulsified Asphalts for Damp-proofing or Waterproofing.
     • CAN/CGSB-37.5 - Cutback Asphalt Plastic Cement.
     • CAN/CGSB 37.54 - Polyvinyl Chloride Roofing and Waterproofing Membrane.
     • CAN/CGSB-37.58 - Membrane, Elastomeric, Cold-Applied Liquid, for Non-Exposed Use in Roofing and Waterproofing.
     • CAN/CGSB 37-GP-9 - Primer, Asphalt, Unfilled, for Asphalt Roofing, Damp-proofing and Waterproofing.
     • CAN/CGSB 37-GP-36M - Application of Filled Cutback Asphalts for Damp-proofing and Waterproofing.
     • CAN/CGSB 37-GP-52M - Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.
     • CAN/CGSB 37-GP-56M - Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
     • NRCA (National Roofing Contractors Association) - Roofing and Waterproofing Manual.

3. Products
   • Foundation waterproofing shall be by means of a heavy-duty liquid-applied or sheet-type water-proof membrane. Systems approved for use include:
     • Polymer-modified asphalt membranes, spray or trowel-applied, to CAN/CGSB-37.2 or CAN/CGSB-37.58, as applicable.
     • Polyurethane liquid membranes, spray, roller or trowel-applied.
     • Modified bituminous sheet membranes, torch-applied, conforming to CGSB 37-GP-56M.
     • Bentonite clay sheets.
• Cementitious water-proofing products are not approved for use.
• Bituminous damp-proofing products are not approved for use.
• Self-adhering membranes (Bakor Blueskin WP200, Soprema Colphene 3000 etc...) are not approved for below-grade applications.
• Specify low VOC, low-odour systems where possible, subject to installation temperatures.

4. Design & Execution
• Design details shall conform to manufacturer’s recommendations.
• Ensure compatibility of all components of the foundation waterproofing and insulation, including waterproofing membranes, primers, adhesives and insulation materials.
• Some water-proofing membranes require a separation layer to prevent adhesion of the insulation to the membrane. Comply with manufacturer’s recommendations in this regard.
• Installation shall conform to manufacturer’s recommendations.
• Specify that work is performed in accordance with NRCA Waterproofing Manual.

5. Warranty
• Specify a five (5) year manufacturer warranty for waterproofing failing to resist penetration of water. Warranty shall cover all waterproofing materials and workmanship, as well as the removal and replacement of all materials concealing waterproofing.
B. Shell

B10 Superstructure

B1010 Floor Construction

- Consider the use of exposed structural elements where appropriate, to eliminate unnecessary finish materials.
- Concrete toppings should be poured throughout the Building prior to erecting partitions. Where concrete floor leveling compounds or toppings are applied a chemical bonding solution is required.
- Consideration shall be given to future changes in use and occupancy when sizing floor structures and building columns. Consider allowing for greater live loads than the immediate program requires.
- Ensure that floors slope toward floor drains, where applicable.
- Avoid steps and level changes wherever possible, to accommodate floor cleaning equipment & accessibility issues.
- On structural drawings, indicate all design loads, including assumed superimposed dead loads, partition allowances and live loads. This information is often required when future changes are considered.
B1020 Roof Construction

- Refer also to Part 6, Section B30 - Roofing.
- On structural drawings, indicate all design loads, including built-up snow loads, partition allowances and live loads. This information is often required when future changes are considered.
- Roofing systems, details and specifications will be reviewed by *Facilities Management Division* and the Building Science Consultant appointed by the University.
- All roofing installations shall be inspected by the manufacturer’s technical representative and by an independent testing and inspection agency appointed by the University, to ensure compliance with CRCA standards.
- Where feasible, roofs should drain to storm water retention ponds, to reduce impact on the storm water sewer system.
- Waterproof membrane flashings shall be provided under all sheet metal flashings. Sheet metal flashings are to be designed to shed water and to protect the membrane, but not as the primary waterproofing measure.
- It has been established that many cases of roofing failure may be attributed to damage done by other trades requiring access to the roof surface after the roofing contractor has completed his work. The *Consultant* should emphasize precautions necessary by other trades to avoid damage to completed roofing and should make the *Contractor* responsible for ensuring that such precautions are taken.
- Requirements for handrails and guardrails are mandated by both the National Building Code and the Saskatchewan Occupational Health and Safety Act and Regulations. *Consultants* shall ensure that University buildings comply with these requirements.
- Requirements for fall-arresting devices are mandated by the Saskatchewan Occupational Health and Safety Act and Regulations. *Consultants* shall ensure that University buildings comply with these requirements.
- The University has adopted a standard fall protection system, the SALA EZ-Line Horizontal Lifeline System, Model 7605063. Specify anchor points in compliance with the requirements of this system. *See Appendix XXX.*
1. **General Requirements**
   - Low-slope roofs shall be designed as insulated, fully adhered, protected membrane (inverted) roofing systems, unless otherwise agreed by Facilities Management Division, consisting of the following basic components: ballast, filter fabric, insulation, protection board, water-proof membrane, structural deck. Components may vary depending on the particular system employed.
   - Other systems may be considered for retrofit applications where the existing structure will not permit an inverted roof assembly.
   - *For consideration: include standard for SBS Modified-Bitumen roofing systems?*

2. **Reference Standards**
   Low-slope roof materials & installations shall conform to the most recent edition of the following standards, as applicable:
   - ASTM D448 - Classification for Sizes of Aggregate for Road and Bridge Construction.
   - ASTM C578 - Rigid, Cellular Polystyrene Thermal Insulation.
   - ASTM D4637 - EPDM Sheet Used In Single-Ply Roof Membrane.
   - CAN/ULC-S701 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.
   - CGSB 37-GP-52M - Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.
   - FM (Factory Mutual) - Roof Assembly Classifications.
   - Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.

3. **Products – Inverted Roof**
   - Ballast: smooth river rock, 38-50mm diameter, washed, free of fines, dirt, organic material and long splinters, light coloured. No sharp-edged crushed rock shall be used. Material to be approved by Facilities Management Division and roofing membrane manufacturer.
   - Pavers: precast concrete units, 28 MPa air entrained mix, 610mm x 610mm x 50mm thick, natural colour, slip-resistant finish. Use roof pavers only for perimeter applications and walking surfaces.
   - Filter Fabric: Woven polyolefin fabric, 100% polyethylene, UV stabilized, water permeable.
• Insulation: Minimum effective thermal resistance of RSI 7.0. (R40) Acceptable types include:
  ▪ Extruded or expanded polystyrene board, Type 4, ship-lapped edges, channeled on the base layer, to CAN/ULC-S701.
• Water-proof membrane: Ethylene Propylene Diene Monomer (EPDM) membrane, conforming to CGSB 37-GP-52M. TRA membrane by Tremco or approved equivalent.
• Cant Strip: as recommended by membrane manufacturer.
• Underlay: on steel roof decks, provide an underlay as a base for the application of the membrane. Use mechanical fasteners. Acceptable products include:
  • 12.7mm exterior gypsum sheathing board to ASTM C1278/C1278M, glass fibre reinforced core, moisture resistant, paperless face, w/ taped joints.

4. Design & Execution
• Design details shall conform to manufacturer's recommendations.
• Installation shall conform to manufacturer's recommendations.
• Provide a continuous air/vapour barrier, sealed to the air/vapour barrier in the wall assembly.
• Ensure compatibility of all products and systems specified.
• Low-slope roofs shall be designed with a minimum 2% slope to drain. Where feasible, greater slopes should be considered.
• Roof slopes are to be achieved by the slope of the structure, rather than by the use of tapered insulation.
• Roof drains shall be located at designed low points. Consideration shall be given to structural deflections in the location of roof drains, to ensure that ponding does not occur in mid-span locations.
• On roofing replacement projects, consideration shall be given to the provision of additional roof drains, to comply with current roofing practice.
• Provide an internal roof drain system, tied into the storm drain.
• Provide a minimum of two (2) drains per contained drainage area. For small roof areas, the use of scuppers may be considered, with the approval of Facilities Management Division.
• Provide concrete pavers around all perimeters and traffic areas.
• The roofing membrane shall be carried up above the maximum depth of water in flood situations.
• Overflow scuppers shall be provided for emergency overflow control. Scuppers are to be designed for this use only, and should not be the primary means of drainage.
• Cant strips should be used at all corners between roof and walls.
• Parapets shall be sloped to drain back towards the roof.
• Provide walkways from roof access points to mechanical equipment. Provide walkways around the full perimeter of each piece of mechanical equipment. Walkway materials shall be as recommended by the roofing manufacturer. Ensure roof drainage is not impeded by walkways.
5. Warranty

- **Contractor’s Warranty:** Specify a standard Canadian Roofing Contractor’s Association (CRCA) or Saskatchewan Roofing Contractor’s Association (SCRA) warranty as follows: Correct at Contractor’s expense any defects in the Work due to workmanship occurring within a period of two (2) years from the date of Substantial Performance of the Work.

- **Manufacturer’s Warranty:** Specify a Manufacturer’s warranty as follows: Manufacturer shall provide a warranty against defective materials for a period of fifteen (15) years from the date of Substantial Performance of the Work. During year 2, year 5 and year 7 of the warranty, the manufacturer shall visually inspect the roof at no cost to the Owner noting any deficiencies and arranging for their proper repair. The roofing contractor will supply and install materials to the acceptance of the manufacturer in order to qualify for the manufacturer’s warranty.
B1022 Pitched Metal Roofs

1. General Requirements
   • Pitched metal roofs shall be designed as a rainscreen, with a waterproof membrane/air barrier, flashed and drained to the exterior, in addition to the metal sheet or panel cladding, unless otherwise agreed by Facilities Management Division.

2. Reference Standards
   • Pitched Metal Roof materials & installations shall conform to the most recent edition of the following standards, as applicable:
     • AISI - (American Iron and Steel Institute) - Stainless Steel - Uses in Architecture.
     • ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
     • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     • ASTM A792/A792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
     • ASTM B370 - Copper Sheet and Strip for Building Construction.
     • CDA (Copper Development Association) - Contemporary Copper, A Handbook of Sheet Copper Fundamentals, Design, Details and Specifications.
     • CDA - Copper Roofing - A Practical Handbook.
     • Canadian Roofing Contractors' Association (CRCA) - Canadian Roofing Reference Manual.
     • Canadian Roofing Contractors’ Association (CRCA) - CRCA Specification Manual.

3. Products
   • Metal Roofing: Acceptable materials include:
     ▪ Fluoropolymer-coated sheet steel. Insert specification.
     ▪ 55% Aluminum-Zinc alloy coated sheet steel (Galvalume) to ASTM A792/A792M, minimum 0.61mm thick base metal.
     ▪ Copper sheet to ASTM B370, cold rolled, 0.8mm thick, natural finish.
     ▪ Zinc sheet. Insert specification.
   • Metal Roofing: Acceptable systems include:
     ▪ Standing seam roofing.
     ▪ Flat seam roofing.
     ▪ Batten seam roofing.
     ▪ Panel systems.
• Insulation: Minimum effective thermal resistance of RSI 6.2 (R35), acceptable types include:
  ▪ Extruded or expanded polystyrene board, Type 4, ship-lapped edges, channeled on the base layer, to CAN/ULC-S701.
  ▪ Mineral Fibre Board, conforming to CAN/CGSB-51.31-M84 and CAN/ULC-S702.
• Air Barrier / Vapour Barrier / Water-proof membrane: Acceptable systems include:
  ▪ Composite self-adhesive sheet waterproofing membrane comprised of SBS modified bitumen and a cross laminated polyethylene film. Ice & Water Shield by W.R. Grace Ltd., Bakor Blueskin SA or Bakor RF200, or approved equivalent.
• Underlay: on steel roof decks, provide an underlay as a base for the application of the membrane. Use mechanical fasteners. Acceptable products include:
  ▪ 12.7mm exterior gypsum sheathing board to ASTM C1278/C1278M, glass fibre reinforced core, moisture resistant, paperless face.
  ▪ 12.7mm exterior-grade pressure-treated plywood.

6. Design & Execution
• Design details shall conform to manufacturer’s recommendations and SMACNA Architectural Sheet Metal Manual.
• Installation shall conform to manufacturer’s recommendations and SMACNA Architectural Sheet Metal Manual.
• Provide a continuous air/vapour barrier, sealed to the air/vapour barrier in the wall assembly. Ensure compatibility of products and systems.
• Provide flashings, gutters, downspouts and other accessories to match roofing material.
• Ensure compatibility of materials & fasteners to prevent galvanic corrosion.
• Roof sheets or panels shall be attached with concealed fasteners. Exposed screw fastenings are not acceptable.
• Design sloped roofs to prevent snow and ice from falling into occupied areas outside the building.
• Design eavestroughs to resist snow and ice loads, as well as to accommodate expected water flow. Locate eavestroughs so that they are accessible for maintenance. Design drainage to prevent ice damming.
• Tie roof drains into the storm drain, or to a storm water retention pond. (Confirm.)

7. Warranty
• Provide a warranty covering all materials and installation for a period of 10 years.
1. Vegetated (Green) Roofs
   • *Section under development.*
   • Consideration shall be given to the provision of “Green” roofs where possible.
   • Details shall be developed on a project-by-project basis under the guidance of *Facilities Management Division.*

2. Slate Roofs
   • *Section under development.*
1. General Requirements
   • Unless otherwise directed, exterior walls shall be designed to employ the pressure-equalized rain screen principle, which consists of the following basic characteristics:
     ▪ an exterior cladding (rainscreen)
     ▪ a flashed, drained and vented air space, pressure-equalized to the exterior.
     ▪ a water-resistive membrane applied to the exterior face of the back-up wall.
     ▪ an air barrier system forming part of the back-up wall. (Note: the water-proof membrane and air-barrier are often combined within a single component.)
     ▪ Agricultural, service, accessory, and uninsulated buildings may be designed using a non-rainscreen approach. In such cases, materials and systems may vary from those listed below, and will be evaluated on a case-by-case basis.

2. Reference Standards
   • Masonry materials & installations shall conform to the most recent edition of the following standards, as applicable:
     • ASTM C568 - Limestone Dimension Stone.
     • CSA A165 - Standards on Concrete Masonry Units.
     • CSA A179 - Mortar and Grout for Unit Masonry.
     • CSA-A370 - Connectors for Masonry.
     • CSA A371 - Masonry Construction for Buildings.
     • CAN/CSA A3000 - Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
     • CAN/CSA A82 - Fired Masonry Brick Made from Clay or Shale.
     • CSA S304.1 - Design of Masonry Structures.
     • ILI (Indiana Limestone Institute of America, Inc). - Indiana Limestone Handbook.
     • Composite Metal Panels & Metal Cladding shall conform to the most recent edition of the following standards, as applicable:
       • ASTM A167 - Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet, and Strip.
       • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
• ASTM A606 - Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

• ASTM A755/A755M - Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process For Exterior Exposed Building Products.

• ASTM A792/A792M - Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.

• ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.


• CAN/CSA-G40.20-M87 - General Requirements for Rolled or Welded Structural Quality Steel

• CAN/CSA-G40.21-M87 - General Requirements for Structural Quality Steels.

• CAN/CSA-S136 - Cold Formed Steel Structural Members.

• CDA (Copper Development Association) - Contemporary Copper, A Handbook of Sheet Copper Fundamentals, Design, Details and Specifications.

• CSA S136.1 - Commentary on Cold Formed Steel Structural Members.

• CSSBI (Canadian Sheet Steel Building Institute) - 20M-99 Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications (includes ICTAB 20M-99).

• CSSBI (Canadian Sheet Steel Building Institute) - S8-07 Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.

• CSSBI (Canadian Sheet Steel Building Institute) - S10-99 How To Series - Insulated Sheet Steel Wall Assemblies.

• CSSBI (Canadian Sheet Steel Building Institute) - S11-00 How To Series - Insulated Sheet Steel Roof Assemblies.

• CSSBI (Canadian Sheet Steel Building Institute) - S14-00 How To Series - Light Gauge Steel Roofing and Siding.

• Fibre-cement boards or panels shall conform to the most recent edition of the following standards, as applicable:


• Wood cladding shall conform to the most recent edition of the following standards, as applicable:

  • ALSC (American Lumber Standards Committee) - Softwood Lumber Standards.

  • ANSI A208.1 - Mat Formed Wood Particleboard.


  • ASTM D1760 - Pressure Treatment of Timber Products.

  • CAN/CGSB 11.6-M - Installation of Exterior Hardboard Cladding.

  • NLGA (National Lumber Grading Association) - Standard Grading Rules for Canadian Lumber.

  • WWPA (Western Wood Products Association).
- WRCLA (Western Red Cedar Lumber Association) - Specifier's Guide to Western Red Cedar.

- Insulation shall conform to the most recent edition of the following standards, as applicable:
  - ASTM C578 - Rigid, Cellular Polystyrene Thermal Insulation.
  - CAN/ULC-S701 - Thermal Insulation, Polystyrene, Boards and Pipe Covering.

- Combination Air Barrier / Vapour Barrier / Water-proof membranes shall conform to the most recent edition of the following standards, as applicable:
  - CGSB 37-GP-52M - Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.

- Breather Type Air Barriers shall conform to the most recent edition of the following standards, as applicable:
  - CAN/CGSB-51.32-M77. Sheathing, Membrane, Breather Type.

- Sheathing shall conform to the most recent edition of the following standards, as applicable:
  - CANPLY (Canadian Plywood Association) - Grading and certification.
  - CSA O151 - Canadian Softwood Plywood.
  - CSA O325 - Construction Sheathing.

- Concrete Block Back-up Walls shall conform to the most recent edition of the following standards, as applicable:
  - CSA A370 - Connectors for Masonry.

- Steel Stud Back-up Walls shall conform to the most recent edition of the following standards, as applicable:
Vapour Barriers shall conform to the most recent edition of the following standards, as applicable:


Exterior Paint shall conform to the most recent edition of the following standards, as applicable:

- MPI (Master Painters Institute) - Specifications Manual.
- SSPC (The Society for Protective Coatings) (formerly SSPC - Steel Structures Painting Council) - Steel Structures Painting Manual.

### 3. Products

- **Cladding:** Acceptable materials include, but are not limited to:
  - **Indiana Limestone:** Indiana Oolitic Limestone, as quarried in Lawrence, Monroe, and Owen Counties, Indiana, to ASTM C119 and ASTM C568. Grade: ‘Select’ or ‘Standard’. Colour: Buff. Finish: Smooth.
  - **Greystone:** Dolomitic limestone found near Saskatoon, Saskatchewan, to match existing Greystone on the University campus. The face shape, coursing and pattern of this stone varies considerably from building to building on our campus. These characteristics may be varied by the Consultant depending on the desired effect.
    - Face shape: Rubble Fieldstones, Roughly Squared Ashlar, Rough Ashlar.
    - Finish: Split faced and pitched.
    - Size: Maximum stone face area 0.2 s.m., minimum stone face area 0.06 s.m. 75% of stones shall measure not less that 300mm across.
Mortar: Type as recommended by structural engineer in accordance with CSA A179 and CSA A371. Colour to be confirmed with University Architectural Design Coordinator through Client Representative, on the basis of a full-scale mock-up panel. For most stone mortar applications, a buff colour is preferred over a grey colour. Colour may be modified by various means including the proportions of grey to white cement, mortar tints and sand colour. Good results have been achieved using mortar mixed with a combination of 25% standard grey Portland cement and 75% white non-staining ‘Medusa’ type cement. Mortar for Tyndalstone applications should use only white non-staining cement.

Clay Brick: Exterior Grade, Type S, texture and colour to be determined by Consultant to Owner’s approval, conforming to CAN/CSA A82.

Fibre-cement boards or panels - non-asbestos fibre-cement siding to comply with ASTM Standard Specification C1186, Grade II, Type A, smooth finish.

Metal sheet or panel systems - composite metal panels, prefinished sheet steel, copper, zinc, etc...

Wood cladding, profile to be determined by Consultant, Western Red Cedar, Grade “A-Clear and Better”, or approved equivalent.

Other materials and systems may be proposed for use by the Consultant, and will be evaluated on a case-by case basis.

Insulation: Minimum effective thermal resistance of RSI 4.75 (R27), acceptable types include:

- Extruded or expanded polystyrene board, Type 3 or 4, ship-lapped edges, conforming to CAN/ULC-S701.
- Polyisocyanurate board, faced, ship-lapped edges, conforming to CAN/ULC-S704.
- Mineral Fibre Board, conforming to CAN/ULC-S702.

Combined Air Barrier / Vapour Barrier / Water-proof membrane: Acceptable systems include:

- Composite self-adhesive sheet air barrier membrane comprised of SBS modified bitumen and a cross laminated polyethylene film. Ice & Water Shield by W.R.Grace Ltd., Bakor Blueskin SA, or approved equivalent.
- Torch-applied sheet air barrier membrane. Bakor Blueskin TG, or approved equivalent.
- Trowel-on liquid applied air barrier membrane. Bakor Airbloc 06 or 32.
- Choose low or zero-VOC products where installation temperatures permit.

Air Barrier - Breather Type

- Spun bonded polyolefin sheeting, DuPont Tyvek Commercial Wrap, Typar Stormwrap, or approved equivalent.

Sheathing
- 12.7mm exterior gypsum sheathing board to ASTM C1278/C1278M and ASTM C1177/C1177M, glass fibre reinforced core, moisture resistant, paperless face.
- 12.7mm exterior-grade pressure-treated plywood, to CSA O151-04 and CSA O325-07.

- Back-up Wall
  - Selection of the back-up wall depends on a number of parameters, including cladding material, expected loads, type of building etc...
  - In general, concrete block back-up walls are preferred for walls with masonry cladding, although wood stud and steel stud back-up walls may be considered on a case-by-case basis for some applications.

- Vapour Barrier
  - Sheet Vapour Retarder, Type 1, polyethylene film for above grade application, minimum 10 mil thick, to Can/CGSB-51.34-M - Vapour Barrier Polyethylene Sheet for Use in Building Construction.

- Exterior Paint
  - All materials used shall be lead and mercury free, and shall have low VOC content.
  - All materials used shall be premium grade.

4. Design & Execution
- General
  - Design & installation details shall conform to manufacturer’s recommendations, where applicable.
  - Ensure compatibility of products and systems.
  - Ensure compatibility of materials & fasteners to prevent galvanic corrosion.

- Cladding
  - The cladding provides the first line of defense within a rainscreen system, and should be detailed to shed water, snow and ice. Drip courses, overhangs, flashings and other means shall be employed to limit the degree to which moisture is permitted to penetrate the wall assembly.
  - Joints in the cladding shall be detailed to control water, taking into consideration the kinetic energy of the water, its surface tension and gravity.
  - Openings in the cladding are necessary to control the air pressure difference across the cladding in a rainscreen system. However, pressure equalization shall be addressed in conjunction with the other elements of the wall, particularly the air barrier system. Pressure equalization and weep holes should be sized such that they are no larger than required to achieve their function.
  - The elements that connect the cladding to the back-up wall should be designed to shed water.
Components such as windows and doors that penetrate the cladding, and the junctions between these components and the cladding, should also be designed in accordance with the rainscreen principle in order to shed water to the exterior.

Components that tie the cladding back to the supporting structure, such as masonry ties, connectors and pins, shall be of stainless steel.

Shelf angles, masonry lintels and similar components shall be hot-dipped galvanized steel.

Durable, impact-resistant materials shall be used for all exterior cladding.

Cladding materials shall be selected with consideration for the materials, colours and textures of adjacent buildings.

- Air Space
  - The air space and water-proof membrane together provide a second line of defense against water penetration in a rainscreen wall.
  - The purpose of the air space is to equalize the air pressure across the rainscreen and to provide a drainage channel to direct water to the exterior of the assembly.
  - The air space is vented to the exterior, in order to allow pressure equalization to take place between the air space and the exterior. The number and size of vent holes is calculated to allow air to flow in and out of the air space quickly enough to respond to gusts of wind, so that the pressure difference across the cladding is minimized. This “dynamic” pressure-equalization reduces infiltration of wind-driven rain.
  - The area of the vent holes depends on the efficiency of the air barrier, on the stiffness of the cladding and of the air barrier system, and on the volume of the individual compartments that make up the air space.
  - The air space should be divided into separate drained and vented compartments. This is necessary to control vertical and lateral airflow within the air cavity, because wind-induced air pressure varies across the face of the building. Compartments should be closed at all corners of the building to prevent the wind on one face of the building affecting the wind pressures on adjacent building faces.
  - The minimum allowable width of the air space depends on the cladding material. For brick and stone veneer walls, the minimum width is 25 mm, as per CSA standard A371-04, “Masonry Construction for Buildings”.
  - Self-draining materials, such as semi-rigid glass or mineral fibre insulation panels, may be used in lieu of an open air space, provided it is demonstrated that the assembly provides adequate drainage capacity for the expected drainage loads.
  - For Fieldstone cladding, specify a woven high-density polyethylene mortar net.

- Water-Resistive Membrane, Air Barrier and Vapour Barrier
  - The wall assembly shall be designed such that it functions as an integral system with respect to the control of water, air and water vapour.
A water-resistive membrane shall be employed, providing the primary barrier preventing the ingress of water into components of the wall assembly that may be damaged by it.

An air barrier membrane shall be employed to control air leakage through the wall assembly. It shall be designed to carry the air pressure difference through the envelope.

A vapour barrier shall be employed to control vapour transmission through the wall assembly.

Often, a single membrane acts as both the water-resistive membrane and the air barrier. This membrane may also act as a vapour barrier, depending on the type of membrane used and on the design of the other components of the wall assembly, particularly the location of the insulation within the wall assembly.

It is the responsibility of the designer to ensure that the respective purposes of the water-resistive membrane, air barrier and vapour barrier are understood, that suitable products are specified to perform each of these functions, whether singly or in combination.

The water-resistive membrane, air barrier and vapour barrier should each be continuous. Ensure continuity at junctions between assemblies and at joints between materials. Detailing shall take differential movement into consideration.

The water-resistive membrane, air barrier and vapour barrier should each be sealed to all penetrations, such as door and window frames, pipes, ducts, etc...

Locate the water-resistive membrane and air barrier to the exterior of all structural members.

Detail all flashings such that they are sealed to or lapped under the water-resistant membrane.

The University requires that an independent testing and inspection agency carry out an inspection of all substrate materials before the application of the air barrier and water-resistive membrane. Following the installation of the insulation, water-resistant membrane, air barrier and vapour barrier, a thermographic scan or air pressure test will be performed. The Consultant shall ensure that this is provided for in the Specifications.

Insulation

Analysis shall be carried out on each Project to determine the level of insulation required to achieve the thermal performance characteristics desired. Information on which to base this analysis may be obtained from Facilities Management Division (FMD). The results of the analysis must be approved by FMD.

The Consultant is directed to work with the Building Science Consultant appointed by the University to ensure that the building envelope is designed to obtain maximum possible benefit from the insulation installed.

Locate insulation to the exterior of all structural elements, to reduce cold bridging.

In rainscreen walls, fasten insulation such that it is in direct contact with the surface of the air barrier membrane.
● Insulation should be applied so as to limit thermal stresses in the building structure or fabric.

● Material used shall meet current occupational health standards. *(Note: WSEP to review this statement & clarify.)*

- Sealants
  ● Maintaining weather-tightness should not rely heavily on the application of sealants.
  ● If sealants are used, it should be emphasized that cut-tests may be required to ensure a reasonable standard of quality and workmanship.

- Exterior Paint
  ● Exterior surfaces requiring painting should be kept to a minimum. Where possible, employ pre-finished materials, or materials which weather naturally and do not require paint.
  ● Where exterior paint is employed, painting work shall be in accordance with the Master Painters Institute (MPI) *Painting Manual* requirements.

5. Warranty
- Warranty periods and terms will vary depending on the product and its application. Wherever possible, the Consultant should specify an extended warranty.
1. Reference Standards

- Exterior window & curtainwall materials & installations shall conform to the most recent edition of the following standards, as applicable:
  - ASTM C864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
  - ASTM C920 - Elastomeric Joint Sealants.
  - CAN/CGSB 79.1 - Insect Screens.
  - CSA A440.4 - Window, Door, and Skylight Installation.
  - CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.

- Pressed steel frames shall be manufactured to Canadian Steel Door Manufacturers Association (CSDMA) specifications, and shall conform to the most recent edition of the following standards, as applicable:
  - ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - CAN4-S106 - Standard Method for Fire Tests of Window and Glass Block Assemblies.
  - CGSB 41-GP-19Ma - Rigid Vinyl Extrusions for Windows and Doors.
• CSA G40.20-04/G40.21 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
• CSA W59 - Welded Steel Construction (Metal Arc Welding).
• Canadian Steel Door Manufacturers Association (CSDMA), Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000.
• Canadian Steel Door Manufacturers Association (CSDMA), Selection and Usage Guide for Steel Doors and Frames, 1990.
• NFPA 80 - Standard for Fire Doors and Fire Windows.

• Aluminum frames shall conform to the most recent edition of the following standards, as applicable:
  • AA (Aluminum Association) DAF 45 - Designation System for Aluminum Finishes.
  • AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.
  • AAMA 611 - Voluntary Specifications for Anodized Finishes Architectural Aluminum.
  • AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
  • AAMA SFM-1 - Aluminum Store Front and Entrance Manual.
  • ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  • ASTM B209M - Aluminum and Aluminum-Alloy Sheet and Plate [Metric].
  • ASTM B221M - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].
  • CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.

• Hot-rolled steel frames shall conform to the most recent edition of the following standards, as applicable:
  • ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
• SWI (Steel Windows Institute), standard specification for hot-rolled steel-framed windows.

• Wood frames shall conform to the most recent edition of the following standards, as applicable:
   Architectural Woodwork Manufacturers Association (AWMAC) - Architectural Woodwork Standards.
   Wood frames shall be AWMAC “custom” grade unless otherwise indicated.

• Exterior Glazing shall conform to the most recent edition of the following standards, as applicable:
  • ASTM C1048 - Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
  • ASTM C1172 - Laminated Architectural Flat Glass.
  • CAN/CGSB 12.1-M - Tempered or Laminated Safety Glass.
  • CAN/CGSB 12.4-M - Heat Absorbing Glass.
  • CAN/CGSB 12.9-M - Spandrel Glass.
  • CAN/CGSB 12.10-M - Glass, Light and Heat Reflecting.
  • CAN/CGSB 12.20-M - Structural Design of Glass for Buildings.
  • GANA (Glass Association of North America) - Glazing Manual.

2. Products
• Acceptable framing systems for exterior glazing include: pressed steel frames, extruded aluminum frames, hot-rolled steel frames, wood frames. Other systems may be considered on a case-by-case basis for some applications.

• Clear glass is generally preferred over tinted glass, unless tinted glass is required to match existing installations or to produce specific architectural effects. Clear glazing units incorporating a high-performance low-e coating, such as Cardinal LoE-366 or PPG Solarban 70XL, provide good insulating values and control of heat gain with high visible light transmittance.

• Fixed Windows - required minimum performance characteristics, to CAN/CSA A440:
   Air Tightness: Fixed
   Water Tightness: B7
   Wind Load Resistance: C5
   Condensation Resistance: l = 65

• Operable Windows - required minimum performance characteristics, to CAN/CSA A440:
   Air Tightness: A3
   Water Tightness: B7
   Wind Load Resistance: C5
- Condensation Resistance: \( I = 65 \)
- Forced Entry: \( F20 \)
- Insect Screens: \( S2 \)
- Avoid operable windows directly over entrances, or windows which could give access to the roof.
- Provide opening restrictors on all operable windows at ground level, or in other areas where they may be accessed from the exterior.

- Entrance Framing - required minimum performance characteristics, to CAN/CSA A440:
  - Air Tightness: Fixed
  - Water Tightness: \( B7 \)
  - Wind Load Resistance: \( C5 \)
  - Condensation Resistance: \( I = 60 \)

3. Design & Execution
- Where applicable, window assemblies should be designed as pressure-equalized, rainscreen systems.
- Window frames shall be sealed to the building air barrier and vapour barrier.
- Provide sealed double or triple-glazed units, minimum 25mm thickness, with metal protective edging, for all windows, glazed frames, curtain walls and exterior doors.
- Consider the use of triple glazing and Low-E glass in all applications.
- Window frames shall incorporate a thermal break.
- Allow for structural deflection and thermal expansion and contraction. Prevent structural loads from being transferred into the window frame.
- Window design should provide daylighting to as much of the occupied building area as possible, unless functional requirements dictate otherwise.
- Consider the provision of internal light shelves or other means of providing for deeper penetration of daylight.
- Design of windows and shading shall limit the effect of solar heat gain and glare. The local effects of low mean sun angle, larger number of sun hours, and low moisture and particle content of the atmosphere must be taken into account. Early morning and late afternoon glare, especially during the winter season when sunrise and sunset overlap lecture hours, should also be recognized in the design of windows and shading.
- Sill heights shall take into consideration the furnishing of the space. For example, sill heights in office areas should be high enough to permit effective use exterior wall areas.
- Ideally, none of the window parts should require painting or polishing, inside or out.
- All window hardware should be rugged and securely attached.
- Pressed steel frames shall have a base metal thickness of 1.6mm (16 gauge).
- Pressed steel frames shall be of welded type construction.
• Window details shall be approved by Facilities Management Division and the Building Science Consultant before tender documents are prepared.

4. Warranty
• Provide a 10 year warranty from Substantial Performance of the Work.
• For wood frames, specify the AWMAC Guarantee and Inspection Service.

5. Heritage Windows
• For heritage buildings, normal requirements for performance characteristics and standards for windows may be modified to comply with accepted heritage preservation standards.
• Existing windows of heritage significance shall be retained and repaired where possible.
• New windows shall be designed to match the appearance and detailing of the original windows.
• Increase thermal performance may be obtained by the addition of storm windows or interior secondary glazing.
• Refer to the Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada, for specific requirements.
1. **Reference Standards**
   - Exterior doors (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - ASTM C864 - Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
     - ASTM C920 - Elastomeric Joint Sealants.
     - CSA A440.4 - Window, Door, and Skylight Installation.
     - CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.
     - NFPA 80 - Fire Doors, Fire Windows.
     - NFPA 252 - Fire Tests of Door Assemblies.
     - UL 10B - Fire Tests of Door Assemblies.
     - Pressed steel and stainless steel doors shall be manufactured to Canadian Steel Door Manufacturers Association (CSDMA) specifications, and shall conform to the most recent edition of the following standards, as applicable:
       - ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
       - ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
• CGSB 41-GP-19Ma - Rigid Vinyl Extrusions for Windows and Doors.
• CSA G40.20-04/G40.21 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
• CSA W59 - Welded Steel Construction (Metal Arc Welding).
• Canadian Steel Door Manufacturers Association (CSDMA), Recommended Dimensional Standards for Commercial Steel Doors and Frames.
• Canadian Steel Door Manufacturers Association (CSDMA), Selection and Usage Guide for Steel Doors and Frames.
• NFPA 80 - Standard for Fire Doors and Fire Windows.

• Wood doors shall conform to the most recent edition of the following standards, as applicable:
  • Architectural Woodwork Manufacturers Association (AWMAC) - Architectural Woodwork Standards, “custom” grade unless otherwise indicated.
  • Parks Canada, Standards and Guidelines for the Conservation of Historic Places in Canada.

• Glazing in exterior doors shall conform to the most recent editions of those standards listed under Part 6, Section B2020, ‘Exterior Windows & Glazed Curtainwall’.

• Door hardware shall conform to the most recent edition of the following standards, as applicable:
  • BHMA (Builders Hardware Manufacturers Association) - A156 series.
  • CAN/CSA-C22.2 No. 100 - Motors and Generators.
  • DHI (Door and Hardware Institute Canada) - A115 series.
  • DHI (Door and Hardware Institute Canada) - WDHS.3 - Hardware Locations for Wood Flush Doors.
  • NEMA MG1 - Motors and Generators.
  • UL 305 - Panic Hardware.
  • UL 325 - Door, Drapery, Gate, Louvre, and Window Operators and Systems.
  • ULC-S132 - Emergency Exit and Emergency Fire Exit Hardware.

2. Products
• Acceptable materials for exterior doors and frames include:
  • Welded stainless steel for typical applications.
  • Painted pressed steel for service entrances and similar applications.
  • Prefinished aluminum for light-duty applications only.
• Hardwood (white oak or approved equivalent) may be considered for feature doors, renovations and additions to existing older buildings, with the approval of Facilities Management Division.

• Hardware Specification
  • Hardware finish to be Satin Stainless Steel (BHMA 630), unless otherwise approved, or to match existing building standard (for renovations).
  • Hardware should have rounded edges.
  • The following hardware is acceptable. Substitutions will not be permitted without written approval:
    • Hinges: Hager, Stanley, Monthard - Ballbearing Type. (Pivot hinges are not acceptable).
    • Door Closers: Norton 8500/7500 Series, Yale 3500/4400 Series - No equivalents. (Bottom-mounted and integral-type door closers are unacceptable. Surface mounted overhead type is required. All closers should be field serviceable.)
    • Electric Hold Open Devices: LCN Sentronic 120 VAC or Edwards 1504-AQN5 24V/120VAC Electromagnetic flushwall door holder. No equivalents.
    • Locksets: Mortise type, Yale 8800 Series x CRR trim. Schlage L9000 Series x 03B trim. [Note: do not specify locks with ‘stopwork activator’ or toggle switch (i.e. Yale 8807)].
    • Exit Devices: Yale 7150 Series x 600 Series heavy duty trim x CR handle style. Yale 7100 Series vertical rod x 600 Series heavy duty trim x CR handle style. (Yale exit devices shall have cast flush end caps.) Von Duprin 99 series x 03 handle type - No equivalents. Internal vertical rod type and exit device/mortise type configurations are not acceptable.
    • Overhead Stops: Glynn-Johnson 90 series only, Rixon 9 series only. (Stops shall be surface mounted.)
    • Flush Bolts: Hager, Ives.
    • Automatic Flush Bolts: Door Control, Glynn-Johnson, Hager.
    • Co-Ordinators: Door Control, Glynn-Johnson, Hager.
    • Push/Pulls: Hager, Gallery.
    • Kick Plates: Hager.
    • Door Stops: Hager, Ives, Gallery.
    • Electric Strikes: HES 1000 series only for mortise locks and 9500/9600 series only for exit devices.
    • Electric Keypad Lock: KABA E-Plex model 5266.
    • Astragals, Thresholds, Door bottoms, Weatherstripping, Sound Stripping: Pemko, Reese, Crowder.
    • Mailboxes: Riopel.
    • Handicap operators: Horton 4000 Series. No equivalents. Doors with handicap operators shall be equipped with an electric latch release controlled by the h/c operator.
• Overhead Door Safety Devices: Automatic reversing gear for overhead doors shall be mechanical reversing bar (MRB) type only. Do not specify pneumatic safety devices for overhead doors.

3. Design & Execution
• Stainless steel frames shall be 16 gauge satin coat stainless steel with 304-4 finish.
• Stainless steel doors shall be 18 gauge satin coat stainless steel with a 304-4 finish.
• Steel doors and frames at all exterior walls shall be thermally broken & doors shall be insulated.
• Door frames shall be securely anchored.
• As identified in the Program of Requirements certain doors should have boxes and conduit roughed-in for card access for future security and access control systems.
• Exterior doors should be a standard height of 2150, unless otherwise noted in the Program of Requirements.
• Exterior door widths shall be designed to meet exiting requirements as stipulated in the National Building Code, but shall in no instance be less than 910. Double doors shall be designed with each leaf a minimum dimension of 910.
• Overhead doors shall be 2400 wide by 2150 high, unless otherwise noted in the Program of Requirements.
• Exterior overhead doors shall be insulated.

Hardware Installation
• Specify a working mock-up be provided of the specified CAM and cylinder for review and approval by FMD Key Shop and Client Representative.
• Doors shall be compatible with the University standard lockset and hardware.
• Door pulls shall have through bolt fixing at or near the same height as push plates so that the pull bolts can be hidden.
• The following standard hardware heights should be observed:
  Door Pulls: 700 to 1200
  Push Plates: 1150 to centre
  Door Bars: 1000 to centre
  Door Levers: 1000 to centre
  Dead Bolts: 1300 to centre
  Panic Bolts: 950 to centre
• Provide doors prepared for the specified hardware. Doors shall not be prepped for double cylinder locksets unless a double cylinder lock is specified. Doors prepped for double cylinder locksets when not required will not be accepted.
• Specify that the installer is responsible for ensuring proper operation of doors and hardware. E.g. smooth opening and closing of door, positive latching and smooth cycling of lock levers, proper installation and adjustment of door closers.
• Specify that set screws securing cylinders are to be properly fastened.
• Requirements for installation of door hardware fasteners are as follows:
- All door hardware shall be installed using fasteners provided by the hardware supplier, but self-drilling and self-tapping screws are not approved for use.

- Wood Doors - Specify pre-drilling for all fasteners. Stripped fasteners will not be accepted. Specify through-bolted fasteners for door closers.

- Fire Rated Wood Doors - Specify through-bolted fasteners for door closers.

- Hollow Metal Doors - Self-tapping and self-drilling fasteners are not approved for use. Specify mounting holes to be drilled and tapped to accommodate factory supplied machine screws.

4. Heritage Doors

- For heritage buildings, normal requirements for performance characteristics and standards for doors may be modified to comply with accepted heritage preservation standards.

- Existing doors and frames of heritage significance shall be retained and repaired where possible.

- Where the replacement of existing doors is required, the new doors and frames shall be designed to match the appearance, material, finish and detailing of the original doors.

- The original door hardware should be cleaned and re-used where possible, provided Code requirements are met.

- New hardware should match the finish of existing hardware.

- Refer to the Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada, for other specific requirements.
B30 Roofing

B3010 Roof Coverings

- Section Not Used. Refer to Part 6, Section B1020, ‘Roof Construction’.

B3020 Roof Openings

- Any openings in the roof shall be curbed, waterproofed and flashed, in accordance with CRCA recommended details.
- Provide access to each roof level for maintenance purposes. Design such access to prevent unauthorized access. *(For consideration: access by extension of stairwell? Or by roof hatch/ladder?)*
- Provide roof hatches with:
  - Minimum insulation to RSI 3.5 (R20).
  - Minimum size: 860 x 860 mm.
  - Single-leaf door.
  - Compression spring operator and shock absorbers.
  - Steel manual pull handle for interior and exterior operation.
  - Steel hold open arm.
  - Padlock hasp.
C. Interiors

C10 Interior Construction

C1010 Partitions - General

- Sections C1011 - C1017 describe the requirements for interior partition systems, including masonry partitions, gypsum wall board & stud systems, demountable modular walls, retractable partitions, and interior glazing & frames, windows & sidelights.
- The design of partition walls shall address the requirements specific to each installation, including, but not limited to the following:
  - Fire resistance ratings as required by the National Building Code.
  - Acoustical performance, including specific Sound Transmission Class (STC) ratings and Noise Reduction Coefficients (NRC) listed in Part 5 of this document.
  - Structural design.
  - Security requirements.
  - Durability, ease of maintenance and ease of replacement.
1. General Requirements

- Interior Masonry: Refer to Part 6, Section C3012, ‘Concrete & Masonry Wall Finishes’.
- Gypsum Wall Board: Refer to Part 6, Section C3016, ‘Gypsum Wallboard’.
C1012 Demountable Modular Partitions

1. General Requirements
   - Demountable modular partitions are unitized wall systems designed to be taken down and re-used in other locations and configurations, when the original configuration of rooms is no longer suitable to the occupants.
   - These systems are encouraged, because they have been found to simplify the construction process, reduce disruption of building occupants due to dust and noise during construction, and reduce demolition waste.
   - Consideration should be given to the use of these wall systems in lieu of standard gypsum wall board partitions in locations where partitions are required to the underside of drop ceilings.

2. Reference Standards
   - Demountable modular partitions (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     - ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Profiles, and Tubes.
     - ASTM C665 - Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
     - ASTM C1002 - Steel Self-Piercing, Tapping Screws for the Application of Gypsum Panel Products on Metal Plaster Bases to Wood Studs or Steel Studs.
     - ASTM C1036: Standard Specification for Flat Glass
     - ANSI/BIFMA X5.6 - Standard for Office Furnishings; Panel Systems, Tests.
     - CGSB: CAN/CGSB 12.20 - Structural Design of Glass for Buildings
     - CSA C22.2 No. 203 Canadian Electrical code, Part II. -Modular Wiring Systems for Office Furniture.
     - Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.
3. Products

- Acceptable systems include: Haworth “Lifespace”, Haworth “Enclose”, Steelcase “Pathways”, DIRT “Movable Wall”. Alternate systems will be considered upon request.

- Where Demountable Wall Systems have previously been installed in a building, consideration shall be given to the specification of matching systems, to ensure maximum future flexibility.

4. Design & Execution

- Minimum Sound Transmission Class (STC) rating: 38, tested in accordance with ASTM E90 and E413.

- Wall systems shall be demountable, designed to permit relocation, reconfiguration and re-use of all parts.

- System shall be capable of four direction lateral expansion.

- System shall be non-progressive; shall allow for the removal and re-installation of panels from either side of the partition, and at any point in a panel run, without disturbance of adjacent panels.

- Specify low-VOC adhesives & sealants, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.1.

- Specify low-VOC paints and coatings, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.2.

- Specify wood, agrifibre products and laminating adhesives that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.

5. Warranty

- Specify a manufacturer’s warranty against defects in materials and workmanship for a period of 10 years.
C1013 Retractable Partitions

1. General Requirements
   • Retractable partitions are discouraged, because they tend to break down frequently.

2. Reference Standards
   • Retractable partitions (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM E90 - Airborne-Sound Transmission Loss of Building Partitions and Elements.
     • ASTM E413 - Classification for Rating Sound Insulation.
     • NEMA LD-3 - High - Pressure Decorative Laminates.

3. Products
   • Where retractable partitions are required, they shall be flat acoustic partitions, folding or sliding panel type, with both floor and ceiling tracks.
   • Manual operation is preferred, unless the partition is of a size and weight that make manual operation impractical.

4. Design & Execution
   • Noise Reduction Coefficient (NRC): To be determined on the basis of the room requirements. Consult Client Representative.
   • Sound Transmission Coefficient (STC): 55, measured in accordance with ASTM E413 and E90.
   • Provide flexible acoustic seals at jambs, ceilings, floor and above track to structure.

5. Warranty
   • Specify a manufacturer’s warranty against defects in materials and workmanship for a period of 5 years.
1. Reference Standards
   - Pressed steel frames shall be manufactured to Canadian Steel Door Manufacturers Association (CSDMA) specifications, and shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     - CAN4-S104-M - Fire Tests of Door Assemblies.
     - CAN4-S105 - Fire Door Frames Meeting the Performance Required by CAN4-S104.
     - CGSB 41-GP-19Ma - Rigid Vinyl Extrusions for Windows and Doors.
     - CSA G40.20-04/G40.21 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
     - CSA W59 - Welded Steel Construction (Metal Arc Welding).
     - Canadian Steel Door Manufacturers Association (CSDMA), Recommended Dimensional Standards for Commercial Steel Doors and Frames.
     - Canadian Steel Door Manufacturers Association (CSDMA), Selection and Usage Guide for Steel Doors and Frames.
     - DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
     - NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
     - Aluminum frames (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
       - AA (Aluminum Association) DAF 45 - Designation System for Aluminum Finishes.
       - AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
       - AAMA 611 - Voluntary Specifications for Anodized Finishes Architectural Aluminum.
       - ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
• ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
• ASTM B209M - Aluminum and Aluminum-Alloy Sheet and Plate [Metric].
• ASTM B221M - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].
• CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.

• Hot-rolled steel frames (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
  • ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  • CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.
  • CSA A440.4 - Window, Door, and Skylight Installation.
  • SWI (Steel Windows Institute), standard specification for hot-rolled steel-framed windows.

• Wood frames (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
  • Architectural Woodwork Manufacturers Association (AWMAC) - Architectural Woodwork Standards, “custom” grade unless otherwise indicated.
  • Specify wood, agrifibre products and laminating adhesives that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.

• Interior glazing shall conform to the most recent editions of those standards listed under Part 6, Section B2020, ‘Exterior Windows & Glazed Curtainwall’.

2. Products
• Acceptable framing systems for interior glazing include: pressed steel frames, extruded aluminum storefront frames, hot-rolled steel frames, wood frames, demountable modular wall system framing.
• All interior glazing shall be laminated, wired or tempered safety glass.

3. Design & Execution
• In applications using borrowed light, it should be noted that translucent or tinted glass is easier to maintain than clear glass, and that smooth surfaces are easier to maintain than ribbed or embossed glass.
• All interior framing for glazing shall incorporate a 100mm bottom sill.
• Pressed steel frames shall have a base metal thickness of 1.6mm (16 gauge).
• Pressed steel frames shall be of welded type construction.
• Demountable Modular Wall Systems may contain glazed sections, or may be used as full-height glazed screens. Please refer to Section C1012, ‘Demountable Modular Partitions’.
C1020 Interior Doors

1. Reference Standards
   - Pressed Steel Door & Frames (materials & installations) shall be manufactured to Canadian Steel Door Manufacturers Association (CSDMA) specifications, and shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A653/A653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     - CAN4-S104-M80 - Fire Tests of Door Assemblies.
     - CAN4-S105 - Fire Door Frames Meeting the Performance Required by CAN4-S104.
     - CGSB 41-GP-19Ma - Rigid Vinyl Extrusions for Windows and Doors.
     - CSA G40.20-04/G40.21 - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
     - CSA W59 - Welded Steel Construction (Metal Arc Welding).
     - Canadian Steel Door Manufacturers Association (CSDMA), Recommended Dimensional Standards for Commercial Steel Doors and Frames.
     - Canadian Steel Door Manufacturers Association (CSDMA), Selection and Usage Guide for Steel Doors and Frames.
     - DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
     - NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

   - Aluminum Doors & Frames: Refer to Part 6, Section C1017.

   - Hot-rolled Steel Doors & Frames: Refer to Part 6, Section C1017.

   - Wood Doors & Frames: Shall be manufactured to the most recent edition of the Architectural Woodwork Manufacturers Association (AWMAC) - Architectural Woodwork Standards, “Premium” grade unless otherwise indicated, and shall conform to the most recent edition of the following standards, as applicable:
     - ANSI A135.4 - Basic Hardboard.
     - ASTM E413 - Classification for Rating of Sound Insulation.
     - CAN4 S104 - Fire Tests of Door Assemblies.
     - CAN4-S105M - Fire Door Frames Meeting the Performance Required by CAN4-S104.
     - CHPVA (Canadian Hardwood Plywood and Veneer Association).
• HPVA (Hardwood Plywood and Veneer Association).
• ITS (Intertek Testing Services) - Certification Listings.
• Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.
• Note: The CSA standard CAN/CSA O132.2 Series-90 - Wood Flush Doors was archived in 2010 and will not be replaced. Please reference the Architectural Woodwork Manufacturers Association (AWMAC) - Architectural Woodwork Standards instead.

• Glazing: refer to Part 6, Section B2020, ‘Exterior Windows & Glazed Curtainwall’.

2. Products
• Acceptable materials for interior doors: pressed steel, glass with extruded aluminum or hot-rolled steel frames, solid core flush wood doors with hardwood veneer.
• Acceptable framing systems for interior doors include: pressed steel frames, extruded aluminum frames, hot-rolled steel frames, wood frames, demountable modular wall system framing.
• Hardware & Hardware Installation: Refer to Part 6, Section B2030 - Exterior Doors
• Glazing: shall be laminated, wired or tempered safety glass, and shall be dry-glazed.
• Specify wood, agrifibre products and laminating adhesives that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.

3. Design & Execution
• Specify interior doors to a standard height of 2150 mm, excluding any transoms, unless specific room requirements dictate otherwise.
• Interior single doors should be a minimum of 910mm wide (door leaf dimension), unless otherwise noted.
• Pressed steel frames shall have a base metal thickness of 1.6mm (16 gauge).
• Pressed steel doors shall have a base metal thickness of 1.2mm (18 gauge).
• Pressed steel frames shall be of welded type construction.
• Aluminum doors and frames for interior applications shall be non-thermally broken, except where used in areas of high humidity.
• For aluminum door and frame requirements, refer to Part 6, Section C1010, Partitions - Interior Glazing & Frames.
• Where hot-rolled steel frames are used for interior glazed screens, doors may be framed in the same material, and according to the standards listed in Part 6, Section C1010, Partitions - Interior Glazing & Frames.
• Wood doors shall be solid core flush type, with hardwood veneer, except where historical styles are desired to match existing original doors.
• Wood doors may be mounted in pressed steel or wood frames, at the Consultant’s discretion.
• Provide all wood doors with brushed stainless steel kick plates extending the full width of the door.

4. Heritage Doors
• For heritage buildings, normal requirements for performance characteristics and standards for doors may be modified to comply with accepted heritage preservation standards.
• Existing doors and frames of heritage significance shall be retained and repaired where possible.
• Where the replacement of existing doors is required, the new doors and frames shall be designed to match the appearance, material, finish and detailing of the original doors.
• The original door hardware should be cleaned and re-used where possible, provided Code requirements are met.
• New hardware should match the finish of existing hardware.
• Refer to the Standards and Guidelines for the Conservation of Historic Places in Canada, published by Parks Canada, for other specific requirements.
C1030  Fittings & Specialties

1. General Fittings & Misc. Metals
   • In general, any item within public reach, such as cover plates on drinking fountains, door push plates, etc... should be fixed in place with tamper-proof screws.
   • The use of plastic shields and wooden plugs to cover mounting screws is not acceptable. Use of purpose-made concealed fasteners where possible.
   • For exposed fittings, the preferred finish is brushed or satin stainless steel.

2. Corner Guards
   • 75mm x 75mm x 1200mm high, brushed stainless steel type, screw fixed or adhesive fixed to outside corners.
C1031 Toilet Partitions

1. Reference Standards
   • Toilet Partitions (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
     • NEMA LD-3 - High - Pressure Decorative Laminates.

2. Products & Materials
   • Doors and panels: NEMA LD-3 solid phenolic core, with high pressure plastic laminate facing, or solid colour reinforced composite. Doors, panels & screens: min. 25mm thick, pilasters: min. 32mm thick.
   • Stainless Steel Sheet Metal: to ASTM A 167, type 316, No. 4 finish.
   • Pilaster Shoe: ASTM A167 type 304 stainless steel, No. 4 finish, 75 mm high, with adjustable screw jack.
   • Head Rails: Hollow stainless steel or aluminum tube, 25 x 41 mm size, with anti-grip strips.
   • Attachments, Screws, and Bolts: Stainless steel; tamper proof type, heavy duty extruded aluminum brackets.
   • Through Bolts and Nuts: Stainless steel with tamper proof heads.
   • Hardware: Stainless steel, brushed or satin finish.
     • Hinges: Heavy duty pivot hinges, gravity type, adjustable for door close positioning, with nylon bearings.
     • Door strike and keeper with rubber bumper.
     • Coat hook, satin finish stainless steel.
   • Acceptable products:
     ▪ Bobrick Sierra series Solid Colour Reinforced Composite.
     ▪ Bobrick Duraline Series Solid Phenolic Toilet Compartments.
     ▪ Bradley Mills Solid Phenolic Toilet Compartments.
     ▪ Decolam Solid Phenolic Toilet Compartments.
     ▪ Watrous Solid Phenolic Toilet Compartments.

3. Design & Execution
   • Specify floor / wall mounted partitions.
   • Comply with the requirements of Part 3 of this Manual, Section 3.8 “Accessibility”.
   • Door swings shall be inwards, except where outward swinging doors are required for accessibility.

4. Warranty
   • Specify 10 year manufacturer’s warranty.
C1033 Lockers

1. Reference Standards
   - Lockers (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     - NEMA LD-3 - High-Pressure Decorative Laminates.

2. Products & Materials
   - Acceptable products:
     - Prefinished steel lockers with prefinished steel doors.
     - Stainless steel lockers with stainless steel doors.
     - Solid phenolic lockers with solid phenolic doors.
   - Component specifications for prefinished steel & stainless steel lockers:
     - Back & sides: 24 gauge steel, continuous lock forming, spot welded.
     - Bottom: 16 gauge steel, spot welded.
     - Top: 20 gauge steel, spot welded.
     - Door Frame: 16 gauge steel, channel-welded.
     - Flush door: Fully welded sandwich panel with honeycomb core. Outer face: 16 gauge steel, inner face: 20 gauge steel.
     - Trim: 20 gauge steel.
     - Hardware: Heavy-duty, ASTM A167 Type 304 stainless steel, brushed or satin finish.
     - Hinges: 14 gauge, 5 knuckle hinges, 3 per door.
     - Finish (prefinished steel lockers): alkyd baked enamel, not less than 1mm thick. Colour to be approved by University's Interior Designer.
     - Finish (stainless steel lockers): ASTM A167 Type 304, commercial grade, stainless steel with No. 4 polished satin finish.
   - Component specifications for solid phenolic lockers:
     - Solid Phenolic Panels: to NEMA LD-3.
     - Sides: 10mm thick solid phenolic composite panels.
     - Back: 6mm thick solid phenolic composite panels.
     - Top, bottom & shelves: 13mm thick solid phenolic composite panels.
     - Door: 13mm thick solid phenolic composite panels.
     - Hardware & fasteners: Heavy-duty, ASTM A167 Type 304 stainless steel, brushed or satin finish.
- Hinges: Heavy-duty, ASTM A167 Type 304 stainless steel, 3 per door.
- Finish: plastic laminate, pattern to be approved by University Interior Designer.

- Ensure adequate ventilation to inside of lockers.

3. Design & Execution
- Lockers: minimum size of 300 x 500 x 1500h.
- Lockers shall either be installed into a recess, or designed with sloped tops, to prevent the accumulation of dust.
- Specify the following accessories, unless directed otherwise: friction latch, shelf, three coat hooks.
- Specify base, trim & filler panels, as required, to match lockers.
- Requirements for keying, locks and coin-operation will be determined on a case-by-case basis. Confirm with Client Representative.

4. Warranty
- Specify 10 year manufacturer’s warranty.
1. Reference Standards
   - Ornamental Metals & Handrails (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
     - ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
     - ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
     - ASTM B177 - Engineering Chromium Electroplating.
     - ASTM B211M - Aluminum and Aluminum-Alloy Bar, Rod, and Wire (Metric).
     - ASTM B221M - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
     - ASTM B483/B483M - Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications.
     - Architectural Woodwork Manufacturer’s Association of Canada (AWMAC) Architectural Woodwork Standards.
     - CAN/CGSB-1.40 - Anti-corrosive Structural Steel Alkyd Primer.
     - CAN/CSA-G40.20/ G40.21 - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels.
     - CAN/CSA-G164 - Hot Dip Galvanizing of Irregularly Shaped Articles.
     - CSA W59.2 - Welded Steel Construction (Metal Arc Welding).
     - SSPC (The Society for Protective Coatings) (formerly SSPC - Steel Structures Painting Council) - Steel Structures Painting Manual.

2. Products & Materials
   - Acceptable materials:
     - Interior handrails, guardrails and supports: hardwood, brushed stainless steel, painted steel, galvanized steel.
     - Exterior handrails, guardrails and supports: stainless steel only.
     - Panels: hardwood plywood, stainless steel, painted steel, stainless steel woven wire, tempered or laminated glass.
     - Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
Steel Pipe: to ASTM A53/A53M, Grade B, standard weight, black finish.
Stainless Steel: to ASTM A167, type 304, No. 4 finish.
Stainless Steel Tubing: ASTM A269, type 304, commercial grade, seamless welded with No. 4 finish.
Welding materials: to CSA W59.
Welding electrodes: to CSA W48 Series.
Bolts and nuts: to ASTM A325 (bolts and nuts for structural connections) and ASTM A307 (anchor bolts).
Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

Wood: to most recent edition of the Architectural Woodwork Manufacturer’s Association of Canada (AWMAC) Architectural Woodwork Standards, ‘custom’ grade. Specify wood products & finishes that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.
Glass: glazing shall conform to the standards listed under Part 6, Section B2020, ‘Exterior Windows & Glazed Curtainwall’.
Finishes:
- Galvanizing: hot dipped galvanizing with zinc coating 600 g/sq.m., to CAN/CSA-G164.
- Shop coat primer: to CAN/CGSB-1.40.
- Stainless steel: No. 4 finish.
- Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.
- Bituminous paint: to CAN/CGSB-1.108.

3. Design & Execution
- Do not specify cast-in-place welding plates for the connection of handrail supports to concrete. Use anchor bolts, epoxy, or other means.
- Exposed Mechanical Fastenings: careful consideration is required for the placement and appearance of all exposed fasteners. Specify flush countersunk screws or bolts, unobtrusively located, except where specifically noted otherwise.
- Exterior Components: Specify continuously seal joined pieces by continuous welding. Specify condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
- Interior Components: Specify continuously seal joined pieces by continuous welding.
- Specify exposed joints to be ground flush and smooth with adjacent finish surface, exposed joints to butt tight, flush, and hairline, exposed edges to be ground to a small uniform radius.
- Design for expansion and contraction of members and building movement without damage to connections or members.

4. Warranty
- For woodwork, specify the AWMAC Guarantee and Inspection Service.
C1035 Signage

1. General Requirements
   • The following signage is to be provided for in all construction Contracts, unless otherwise directed:
     ▪ "You Are Here" maps.
     ▪ Interior Wayfinding.
     ▪ Room Designation & Numbering.
   • Building directories are not normally required. If a Building Directory is required, the Client Representative will provide design requirements to the Consultant.
   • For information on exterior building signage, refer to Part 6, Section G2040 - Site Development.

2. Products & Materials
   • ‘You-Are-Here’ maps, building directories, room designation & numbering signs and general interior wayfinding signs should be one of the following:
     ▪ Modular Curved Frame Technology System (MCFT), available from 77 Signs, tel.: (306) 931-1130
     ▪ CONVEXion signage system, available from Insign Architectural Signage, tel.: (403) 201-9085.
     ▪ Other approved equivalent.
   • The design of larger specialty signs will be at the discretion of the Consultant, and approved by the Client Representative.
   • For standard sizes, refer to Appendix XXX.

3. Design & Execution
   • The graphic design for all signage shall be provided by the Consultant as part of his or her contract. (Note: Coordinate this requirement with Purchasing.) All graphic design for signage shall be provided in Adobe Illustrator format.
   • "You Are Here" maps: are to be provided at all main entrances and on each floor, near the elevators, in a purpose-made frame. The size of this frame will be specified by the University Interior Designer, through the Client Representative.
   • Interior Wayfinding: Under development. Consult with Client Representative for more information.
   • Room Designation & Numbering: Refer to Appendix XXX for standard.
   • Some deviation from the signage standards are permissible if changes are desired to suit the interior design of a building. Such proposed changes shall be approved by the University Interior Designer, through the Client Representative.
C1038 Whiteboards, Chalkboards, Tackboards, Display Cases, etc…

1. General
   • The requirement for whiteboards, chalkboards, tackboards, display cases and picture rails will be noted in the Program of Requirements.

2. Reference Standards
   • Whiteboards, Chalkboards, Tackboards, Display Cases (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     ▪ ASTM A424 - Steel, Sheet, for Porcelain Enamelling.
     ▪ Architectural Woodwork Manufacturer’s Association of Canada (AWMAC) Architectural Woodwork Standards.
     ▪ Porcelain Enamel Institute - Performance Specifications for Porcelain Enamel Chalkboards.

3. Products & Materials
   • White boards shall be porcelain enamel steel type, consisting of a semi-gloss finish porcelain enamel writing surface on minimum 28 Gauge (0.4mm) thick sheet steel, adhered to a minimum 11mm high density wood fibreboard core, with a 28 Gauge (0.4mm) thick aluminum backer sheet. Colour: white.
   • Chalkboards shall be porcelain enamel steel type, consisting of a matte finish porcelain enamel chalkboard surface on minimum 28 Gauge (0.4mm) thick sheet steel, adhered to a minimum 11mm high density wood fibreboard core, with a 28 Gauge (0.4mm) thick aluminum backer sheet. Colour: black.
   • Tackboards shall be 5-6mm pebble grain natural composition cork on a gypsum board or fibreboard backing material.
   • Trim shall be extruded anodized aluminum, satin finish.
   • Mounting brackets and fasteners shall be concealed.
   • Specify a continuous marker/chalk tray on all whiteboards and chalkboards.

4. Design & Execution
   • Size whiteboards, chalkboards and noticeboards to suit the room size and application.
   • Open notice boards should be located away from breezy areas.
   • Glass-covered tackboards should have hinged, rather than sliding doors, to prevent people from sliding personal notices between the glass panels.
   • The locations and type (glass fronted or open) of notice boards and display cases in public areas shall be determined in consultation with the Client Representative.
   • Glass-covered tackboards, display cabinets, etc… shall be designed and fabricated according to the most recent edition of the Architectural Woodwork Manufacturer’s Association of Canada (AWMAC) Architectural Woodwork Standards, ‘premium’ grade.
   • Notice boards to be mounted in public places should be generously sized.
5. Warranty
   - Specify a 10 year manufacturer’s warranty where applicable.
   - For woodwork, specify the AWMAC Guarantee and Inspection Service.
C1039 Washroom Accessories

1. Reference Standards
   • Washroom Accessories (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
     • ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
     • ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
     • ASTM A1008/A1008M - Steel, Sheet, Cold-Rolled Carbon, Structural, High-Strength Low Alloy and High Strength Low Alloy with Improved Formability.

2. Products & Materials
   • All washroom accessories and fittings shall be brushed or satin stainless steel finish where possible.
   • Baby Change Stations: Bobrick / KoalaKare KB110-SSWM horizontal, Wall-Mounted 18-gauge, type 304 satin stainless steel exterior finish with molded grey polyethylene interior, or approved equivalent.
   • Grab-bars: heavy-duty satin-finish stainless steel grab bars, with peened gripping surface. Grab-bar shall be manufactured from 18-gauge tubular steel, 32mm outside diameter. Mounting Flanges shall be concealed with matching flange covers.
   • Hand Dryers: Dyson Airblade Model AB-02, die-cast aluminum casing, surface-mounted automatic hand dryer, or Excel Xlerator Model XL-5B, brushed stainless steel casing, surface-mounted automatic hand dryer, or approved equivalent. (Design Manual Committee to approve this item.)
   • Hand Towel Dispensers: locking surface-mounted roll-paper-towel dispensers. Bobrick B-2860, satin-finish stainless steel, or approved equivalent.
   • Mirrors: Wall-mounted mirror w/ concealed clip fasteners and brushed stainless steel frame. To CAN/CGSB-12.5, 4MM THICK, Type 3C, film reinforced as backing.
   • Sanitary Napkin Disposal Units: Bobrick B-254 Surface-Mounted Sanitary Napkin Disposal, Satin-finish stainless steel, or approved equivalent.
   • Sanitary Napkin/Tampon Dispenser: Coin-operated dispenser (Surface-Mounted or Recessed). Coin box keying should be unique from other locks in the Building, and not opened by the same key used to replenish the machine. Bobrick B-3500 Napkin/Tampon Vendor (Recessed), Bobrick B-2800 Napkin/Tampon Vendor (Surface-Mounted), Satin-finish stainless steel, or approved equivalent.
   • Soap Dispenser: Dustbane Tradition Plus foaming hand soap dispenser, model 51704. No equivalents.
• Toilet Paper Dispensers: locking 2-roll dispenser or single roll dispensers (double-roll dispensers preferred). Bobrick B-4288 Contura Series Surface-Mounted Toilet Tissue Dispenser, Satin-finish stainless steel, or approved equivalent.

• Waste Receptacles: surface-mounted 75 litre capacity, mounted near sinks. Bobrick B-275 satin-finish stainless steel, or approved equivalent. Where space permits, also specify a free-standing 125 litre capacity bin, Bobrick B-2400, or approved equivalent. Combination towel dispensers / waste receptacles are not approved for use.

3. Design & Execution
• Provide backing for wall-mounted fittings mounted to stud walls.
• A substantial, foolproof method of securing fixtures, dispensers and hardware is essential. All fasteners which are exposed to tampering should have tamper-proof heads.
• In general dispensing fixtures with re-fill needs should match the current University custodial stocked re-fill materials. Confirm requirements with Client Representative.
• Conform to applicable code for access for the handicapped.

4. Warranty
• Specify minimum 3 year manufacturer's warranty.
C20 Stairs

C2010 Stair Construction

1. General Requirements
   • For handrail and guardrail requirements, refer to Part 6, Section C1034, ‘Ornamental Metals & Handrails’.

2. Reference Standards
   • Stairs (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
     • ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
     • ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
     • ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
     • ASTM E935 - Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
     • CAN/CSA A3000 - Cementitious Materials Compendium.
     • CSA A23.1-04/A23.2 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.
     • CSA A23.3 - Design of Concrete Structures.
     • CAN/CSA-G40.20/ G40.21 - General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels.
     • CAN/CSA-G164 - Hot Dip Galvanizing of Irregularly Shaped Articles.
     • CSA S269.1 - Falsework for Construction Purposes.
     • CAN/CSA S269.3-M - Concrete Formwork.
     • CSA S474 - Concrete Structures.
     • CSA W47.1 - Certification of Companies for Fusion Welding of Steel Structures.
     • CSA W47.2-M - Certification of Companies for Fusion Welding of Aluminum.
     • CSA W48 - Filler Metals and Allied Materials for Metal Arc Welding
     • CSA W55.3 - Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
     • CSA W59 - Welded Steel Construction (Metal Arc Welding).
     • CSA W186-M - Welding of Reinforcing Bars in Reinforced Concrete Construction.
     • SSPC (The Society for Protective Coatings) (formerly SSPC - Steel Structures Painting Council) - Steel Structures Painting Manual.
3. Products & Materials
   • Acceptable structural systems for stair construction include:
     ▪ Cast-in-place concrete, including landings.
     ▪ Steel. Landings may be constructed as part of the building structure or as part of the stair assembly.
     ▪ Other structural systems will be considered on a case-by-case basis.
   • Acceptable materials for treads include:
     ▪ Concrete-filled steel pan treads.
     ▪ Precast concrete treads.
     ▪ Cast-in-place concrete, with or without applied finish material. (For acceptable finishes, refer to Part 5, Section 5.7- Stairs.)
     ▪ Folded steel treads with applied finish material.
     ▪ Other materials to be approved on a case-by-case basis.
   • Back-up walls for all finishes in stairwells shall be concrete block or cast-in-place concrete, unless agreed otherwise.

C2020 Stair Finishes
1. Refer to Part 5, Section 5.7- Stairs.
C30 Interior Finishes

1. General Requirements
   • Confirm that interior finishes conform to Building and Fire Code requirements with respect to flame spread, fuel contributed and smoke developed ratings.
   • All finish materials and colours should be approved by Facilities Management Division prior to their specification.
   • Specify that maintenance manuals shall include maintenance instructions on all finish materials.
   • Specify that an additional 2% supply of each finish material be provided for maintenance purposes.
1. General Requirements

- Provide durable, easily cleaned and easily maintained wall finishes.
- Walls exposed to high humidity levels such as washrooms, showers, and wet labs shall be constructed free of any wood products or other material susceptible to moisture damage.
- Hard surfaces are preferred; however, soft finishes may be considered for their acoustic properties, where necessary.
- Dust-catching ledges are to be avoided.
- Provide protection to outside corners in areas prone to damage, including all service areas. Acceptable corner guards include: stainless steel, acrylic/vinyl, masonry. (Acrylic and vinyl corner guards are not approved for use in public areas.)
- Provide protection to walls up to 1200mm above finished floor in areas prone to damage, including all service areas. Acceptable wall protection includes: abuse-resistant drywall, stainless steel, masonry, hardwood veneer plywood.
- Provide expansion joints where walls cross building expansion joints.
C3011  Acoustic Wall Treatment

1. General Requirements
   • Refer also to Part 2, Section 2.4.8 - Review by Acoustical Specialist.

2. Reference Standards
   • Acoustic Wall Treatment (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM C423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

3. Products & Materials
   • Sound absorptive materials shall be selected on the basis of acoustical properties, appearance, strength, ease of cleaning, and fire & flame spread ratings.
   • Brittle, friable or potentially hazardous materials should be avoided.

4. Design & Execution
   • In most instances, sound absorptive materials should be kept well above the occupied zone and should be well secured.
1. **Reference Standards**
   - Interior concrete materials & installations shall conform to the most recent editions of those standards for concrete listed in Part 6, Section A1010 - Standard Foundations.
   - Interior Masonry materials & installations shall conform to the most recent edition of the following standards, as applicable:
     - ASTM C73 - Calcium Silicate Brick (Sand-Lime Brick).
     - ASTM C744 - Prefaced Concrete and Calcium Silicate Masonry Units.
     - ASTM C1329 - Mortar Cement.
     - CAN/CSA A82.1-M - Burned Clay Brick (Solid Masonry Units Made from Clay or Shale).
     - CAN3 A82.8-M - Hollow Clay Brick.
     - CSA A165 Series-04 - Standards on Concrete Masonry Units.
     - CSA A179 - Mortar and Grout for Unit Masonry.
     - CSA S304.1 - Design of Masonry Structures.
     - CAN/CSA A3000 - Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

2. **Products & Materials**
   - Consider the use of masonry partitions or concrete walls for the following applications:
     - Applications where a high levels of impact resistance are required.
     - Applications where Sound Transmission Class (STC) rating of 55 or higher is required.
     - Stairwells (in conjunction with glazing).
     - Main entrances.
     - Public corridors.
     - Large lecture theatres.
   - For high profile public spaces, consider the use of ground-face concrete block, brick, architectural concrete, or other premium finishes.

3. **Design & Execution**
   - **Interior Masonry**
     - Do not paint interior brick or stone.
     - Painted concrete block is discouraged, except where staining from exposure to moisture or wear is expected.
     - Exposed interior masonry shall be sealed with a low-build, low-lustre coating.
• For concrete block walls, provide bull-nosed unit for outside corners.
  
  • Interior Concrete
    • Painted concrete is discouraged.
    • Sand-blasting, bush-hammering, and other decorative exposed concrete finishes are to be considered where appropriate.
C3013  Wall Painting

Section not used. Refer to Part 6, Section C3040 Painting
C3014 Tile & Terrazzo

1. General Requirements
   • For ceramic tile standards, refer to Part 6, Section C3014, ‘Ceramic Tile Flooring’.
   • For terrazzo standards, refer to Part 6, Section C3029, ‘Terrazzo & Polished Concrete Flooring’.
C3015  Wall Plastering

1. Reference Standards
   • Wall Plastering materials & installations shall conform to the most recent edition of the following standards, as applicable:
     • ASTM C28/C28M - Gypsum Plasters.
     • ASTM C35 - Inorganic Aggregates for Use in Gypsum Plaster.
     • ASTM C61/C61M - Gypsum Keene's Cement.
     • ASTM C206 - Finishing Hydrated Lime.
     • ASTM C631 - Bonding Compounds for Interior Gypsum Plastering.
     • ASTM C842 - Application of Interior Gypsum Plaster.
     • ASTM C844 - Application of Gypsum Base to Receive Gypsum Veneer Plaster.
     • ASTM C847 - Metal Lath.
     • ASTM C1396/C1396M - Gypsum Board.
     • CAN/CSA A3000 - Cementitious Materials Compendium.
     • GA-600-06 (Gypsum Association) - Fire Resistance Design Manual.

2. Products & Materials
   • Lath shall be expanded galvanized metal lath to ASTM C847.
   • Interior plaster exposed to moisture shall be Portland cement plaster to CAN/CSA A3000.
   • Plaster for other applications shall be gypsum plaster to CAN/CSA A3000.

3. Design & Execution
   • Plaster installed in bathrooms, kitchens and service rooms shall have a smooth finish.
   • Provide galvanized control joints for Portland cement plaster, at a maximum of 3000 mm o.c.
   • Specify that plaster shall not be installed when substrate or ambient air temperature is less than 10 degrees C nor more than 27 degrees C.
   • Specify a minimum ambient temperature of 10 degrees C during and after installation of plaster.
C3016  Gypsum Wall Board

1. Reference Standards
   - Gypsum Wall Board materials & installations shall conform to the most recent edition of the following standards, as applicable:
     - ASTM C475/C475M - Joint Compound and Joint Tape for Finishing Gypsum Board.
     - ASTM C645 - Non-Structural Steel Framing Members.
     - ASTM C665 - Mineral-Fibre Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
     - ASTM C754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.
     - ASTM C840 - Application and Finishing of Gypsum Board.
     - ASTM C1047 - Accessories for Gypsum Wallboard and Gypsum Veneer Base.
     - ASTM C1278/C1278M - Fiber-Reinforced Gypsum Panel.
     - ASTM C1396/C1396M - Gypsum Board.
     - GA-214 (Gypsum Association) - Recommended Levels of Gypsum Board Finish.
     - GA-216 (Gypsum Association) - Application and Finishing of Gypsum Panel Products.
     - GA-254 - Fire-Resistant Gypsum Sheathing.
     - GA-600-06 (Gypsum Association) - Fire Resistance Design Manual.

2. Products & Materials
   - Where Gypsum Wall Board is required, specify the following types:
     - Standard Gypsum Wall Board (GWB) to ASTM C1396/C1396M at typical interior partitions.
     - Gypsum Ceiling Board to ASTM C1396/C1396M at suspended ceilings.
     - Moisture-Resistant Gypsum Board to ASTM C1396/C1396M at areas exposed to high humidity but not to direct moisture, such as change rooms, rooms adjacent to shower enclosures, etc...
     - Water-Resistant Gypsum Board (glass-fibre reinforced), to ASTM C1278, as a substrate for ceramic tile, epoxy finishes and to all areas exposed to direct moisture, such as shower stalls and change rooms.
Abuse-Resistant Gypsum Board (glass-fibre reinforced, impact-resistant), to ASTM C1278, as areas exposed to high levels of abuse, mechanical impact or vandalism.

Fire-Rated Gypsum Board (type X), to ASTM C1396, C1396M and C1278, as required to achieve fire ratings.

3. Design & Execution

- Gypsum wall board shall be a minimum of 12.5mm thick.
- Steel studs shall be a minimum of 92mm deep, spaced no more than 400 mm o.c.
- The Client Representative will advise where partitions shall extend to underside of structure, and where they shall be terminated at the underside of ceilings.
- In areas where acoustic separation is necessary, provide acoustic insulation between studs, and seal with acoustical sealant. Consult Client Representative to determine where acoustic separations are required.
- Provide continuous 150mm blocking and reinforcement for anchoring of wall-mounted fixtures. Centre blocking at 800mm and 1800mm above finish floor.
- Finish gypsum wall board applications to the following levels, as defined in document GA-214-07, “Recommended Levels of Gypsum Board Finish”, published by the Gypsum Association:
  - Areas above ceilings, and concealed from view: Level 1
  - Walls exposed to view: Level 3
  - Ceilings exposed to view: Level 4
C3017 Vinyl Wallcoverings

1. Reference Standards
   • Vinyl Wallcovering materials & installations shall conform to the most recent edition of the following standards, as applicable:

2. Products & Materials
   • Where Vinyl Wallcoverings are required, specify:
     - Finished Weight: 20 oz
     - Backing: 100% Polyester Osnaburg
     - Width: 1340-1370 mm
     - Maximum Flame Spread: 25, determined on the basis of not less than three tests conducted in conformance with CAN/ULC-S102-M.
     - Acceptable Products:
       - Bolta Vinyl Wallcovering, as distributed by Odyssey Wallcoverings, colour and pattern to be selected by FMD Interior Design Department through Client Representative.
       - Tower Vinyl Wallcovering, as distributed by Metro Wallcoverings. Colour and pattern to be selected by FMD Interior Design Department through Client Representative.
     - Adhesive: Type recommended by wall covering manufacturer to suit application.

3. Design & Execution
   • Installation of materials of this section shall be by the manufacturer’s approved installers, in strict accordance with manufacturer’s installation instructions.
   • The work of this section shall be performed by skilled workers with at least three (3) years successful installation experience with the type of materials specified herein.
   • Submit evidence of experience and obtain Consultant’s approval before proceeding with work.
   • Ensure all surfaces to receive vinyl wall covering are clean, true and free of irregularities.
1. Reference Standards
   • Wall Base materials & installations shall conform to the most recent edition of the
     following standards, as applicable:
     • ASTM F1861 - Resilient Wall Base.

2. Products & Materials
   • Acceptable materials include:
     ▪ Rubber to ASTM F1861.
     ▪ Wood (clear-finished or painted).
     ▪ Moisture-resistant MDF (painted).
     ▪ Brushed or satin stainless steel.
     ▪ Ceramic tile.
   • Rubber Base:
     ▪ To ASTM F1861, Type TS vulcanized rubber or Type TP thermoplastic rubber.
     ▪ Premoulded external corners & end stops, of same material, size, and colour as base.
     ▪ Height: 100 mm.
     ▪ Thickness: 3 mm.
     ▪ Length: Roll.
   • Wood or MDF Base:
     ▪ Exercise discretion in the specification of wood or MDF. Use only in low-moisture and low-traffic areas.
     ▪ Specify only moisture-resistant MDF.
     ▪ Height: 100 mm.
     ▪ Thickness: 18 mm.
     ▪ Length: Maximum practical lengths.
     ▪ For historical preservation projects, match existing profiles.
   • Do not specify vinyl base.
   • Do not specify terrazzo or other coved bases integral with the floor, as they limit the potential for future alteration of floor plans.
   • Specify waterproof adhesive.

3. Design & Execution
   • Bases should be a standard 100mm high.
   • Provide coved junctions between floor and wall surfaces where practical.
1. Products & Materials
   • Acceptable thermoplastic wall protection sheet products for laboratory and similar applications include:
     ▪ Kydex 150 or 160 Class 1/A rated thermoplastic sheet. (Note: Kydex sheets are not PVC-free and low-VOC.)
     ▪ Acrovyn 3000 Class 1/A rated thermoplastic sheet.
   • Thickness: 1.52mm-3.18mm, as required for application.
   • PVC-free and low VOC products are preferred.

2. Design & Execution
   • Follow manufacturer’s written installation instructions.
   • Ensure specified products are resistant to chemicals anticipated in each application.
   • Specify color-matched caulks and moldings.
C3020 Interior Floor Finishes

1. General Requirements
   • Provide durable, easily maintained floor finishes.
   • The acoustic environment of the space shall be considered in the selection of floor finishes.
   • Floor finishes are required to be constructed to strict tolerances, because the efficiency of floor cleaning equipment is greatly impaired by slight bumps and hollows in the finished surface.
   • Specify flooring products and materials in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.3.
   • Floor finishes shall be approved by the University Interior Designer and those responsible for maintenance, through the Client Representative.
   • Consider to have floor finishes installed wall-to-wall, under millwork and interior partitions, in order to facilitate future changes.
   • Specify non-slip material at entry vestibules, washrooms, stair treads, ramps and any other location prone to wetting.
   • Specify metal transitions wherever dissimilar flooring materials meet.
   • Where applicable, terminate floor finishes at centre line of doors.
   • Provide flush expansion joints in flooring materials where they cross building expansion joints.
   • Provide waterproof access panels in floors, flush with adjacent flooring materials.
C3021 Rubber Flooring

1. Reference Standards
   • Rubber Flooring (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM F1859 - Rubber Sheet Floor Covering Without Backing.
     • ASTM F1860 - Rubber Sheet Floor Covering With Backing.

2. Products & Materials
   • Rubber Sheet: to ASTM F1859 or ASTM F1860, 100 percent rubber composition, colour and pattern through total thickness.
   • Backing: organic or inorganic, at the Consultant’s discretion.
   • Thickness: at the Consultant’s discretion, depending on application.
   • Sheet Width: at the Consultant’s discretion.
   • Design: at the Consultant’s discretion.
   • Specify flooring to be sealed using Dustbane Gran-Prix XL, following manufacturer’s instructions.

3. Warranty
   • Specify minimum 10 year manufacturer’s warranty.
1. Reference Standards
   - Carpet materials & installations shall conform to the most recent edition of the following standards, as applicable:
     - Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.
     - CAN/CGSB-4.129 - Carpets for Commercial Use.
     - CRI (Carpet and Rug Institute) - Green Label Indoor Air Quality Test Program.

2. Products & Materials
   - Carpet systems shall meet or exceed the requirements of LEED® Canada-NC Indoor Environmental Quality Credit 4.3 and the Carpet and Rug Institute’s Green Label Indoor Air Quality Test Program.
   - Carpet face and backing shall be 100% recyclable.
   - Binders shall be zero-VOC.
   - Carpet materials and installation methods shall employ no formaldehyde or noxious stabilizers.
   - Carpet shall conform to the following criteria:
     - Type: Tufted
     - Dye Method: Solution dyed or other method providing permanent stain resistance.
     - Pile Fibre: 100% BCF nylon
     - Max. Electrostatic Charge: 3 Kv. @ 20 percent R.H.
     - Stitch Count: Minimum 38 / 10 cm.
     - Gauge: Minimum 39.4 col / 10cm.
     - Pile Height: Maximum 4 mm.
     - Pile Weight: 950 g/sq m.
     - Density Factor: Minimum 13 kilotex, as per ASTM D418.
     - Light Fastness: L5
     - Primary Backing Material: Woven Synthetic
     - Flammability: Insert requirement
     - Recycled Content: Minimum 30%.
     - Adhesive: Premium grade, Zero VOC (solvent free), waterproof type.
     - Anti-Microbial Treatment: permanent (not topical) treatment to prevent bacteria and fungi for the life of the carpet.
3. Design & Execution
   • Carpet tile is preferred for most applications, because it is more easily repaired and worn areas may be replaced.

4. Warranty
   • Specify the following manufacturer’s warranties:
     • 10 year commercial wear.
     • 10 year against unravelling, zippering, delamination and deterioration of backing, not to exclude wet or steam cleaning methods.
     • 10 year against adhesive failure.
     • 10 year colourfastness to light & atmospheric contaminants.
C3023 Sealed Concrete Flooring

1. Reference Standards
   • Sealed Concrete Flooring (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • CSA A23.1-04/A23.2 - Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete.
     • ACI 302 - Guide for Concrete Floor and Slab Construction.
     • ASTM E1155M - Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

2. Products & Materials
   • Specify, depending on the application:
     • Water Repellent Sealer:
       • High quality transparent sealer, breathable, color stable, non-yellowing and non-membrane forming.
       • Multi-component, inorganic, water soluble, modified methyl silicone solution.
       • Penetration: minimum 7 mm.
       • Contains no solvent, VOC, or hazardous ingredients.
       • Does not discolor substrate.
     • Concrete Densifier:
       • High quality penetrating solution, breathable, non-yellowing, with no visible membrane.
       • Penetration: minimum 120 mm.
       • Contains no solvent, VOC, or hazardous ingredients.
       • Does not discolor substrate.
       • Magnesium fluorosilicate and zinc fluorosilicate blend, or approved equivalent.
     • Hydrostatic Sealer:
       • Water-based, breathable, complex catalytic penetrating material.
       • Contains no solvent, VOC, or hazardous ingredients.
       • Does not discolor substrate.
     • Primer: As required by sealer manufacturer.
     • Waterproofing Membrane:
       • Multi-component, catalytic hydrosilicate solution.
       • Contains no solvent, VOC, or hazardous ingredients.
       • Does not discolor substrate.
       • Colour: Clear.
3. Design & Execution
   • Specify an ambient temperature of 10 degrees C minimum during application of concrete floors.
   • Specify concrete floor surfaces to be finished in accordance with CAN/CSA A23.1/A23.2.
   • Specify steel trowel finish for exposed concrete floors.
   • In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains.
   • Specify control joints in accordance with the recommendation of a structural engineer.
   • Specify all products to be applied or installed in accordance with manufacturer’s written instructions.

4. Warranty
   • Specify a 5 year manufacturer’s warranty covering materials and installation.
C3024  Masonry & Stone Flooring

Section Under Development

1. General Requirements
2. Reference Standards
3. Products & Materials
4. Design & Execution
5. Warranty
1. Reference Standards
   - Ceramic Tile materials and installations shall conform to the most recent edition of the following standards, as applicable:
     - ANSI A108/A118/A136.1 - Specifications for the Installation of Ceramic Tile.
     - ASTM C144 - Specification for Aggregate for Masonry Mortar.
     - ASTM C1028 - Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
     - CAN/CGSB-25.20 - Surface Sealer for Floors.
     - CAN/CGSB-51.34-M - Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
     - CAN/CGSB-75.1-M - Tile, Ceramic.
     - TTMAC (Terrazzo Tile and Marble Association of Canada) Maintenance Guide.

2. Products & Materials
   - Specify water-based epoxy grout, Profix Poly 700 or approved equivalent.
   - Specify acid resistant grout in areas subject to chemical exposure.

3. Design & Execution
   - In areas prone to wetting, install ceramic tile over a sheet-type water-proof membrane, turned up 150mm at edges to form a pan.
C3027 Resilient Flooring

1. General Requirements
   - This section describes the requirements concerning Linoleum Sheet Flooring, Sheet Vinyl Flooring, Vinyl Composition Floor Tile and other sheet flooring materials.

2. Reference Standards
   - Resilient Flooring materials and installations shall conform to the most recent edition of the following standards, as applicable:
     - ASTM F1066 - Vinyl Composition Floor Tile.
     - ASTM F1303 - Sheet Vinyl Floor Covering with Backing.
     - ASTM F1700 - Solid Vinyl Floor Tile.
     - ASTM F1913 - Vinyl Sheet Floor Covering Without Backing.
     - ASTM F2034 - Sheet Linoleum Floor Covering.

3. Products & Materials
   - Resilient Flooring - General
     - Specify low-VOC adhesives & sealants, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.1.
     - Specify sealer and wax as recommended by flooring manufacturer.
   - Sheet Vinyl Flooring:
     - Sheet Vinyl Flooring conforming to the most recent edition of ASTM F1303, Type II, Grade 1, with a Class A backing.
     - Minimum nominal thickness: 2.0 mm.
     - Colour and pattern through surface wear thickness.
     - Heat-welded seams.
     - Acceptable products: Armstrong Corlon or approved equivalent.
   - Linoleum Sheet Flooring
     - Linoleum sheet flooring shall conform to the most recent edition of ASTM F2034 - Sheet Linoleum Floor Covering.
     - Linoleum sheet flooring shall be a minimum nominal thickness of 2.5mm for standard applications. Follow the manufacturer’s recommendations with respect to the selection of heavier thicknesses for heavy-duty applications (3.2mm or 4.0mm).
     - Specify heat-welded seams.
     - Specify a matte or satin finish.
- Specify a minimum post-industrial recycled content of 45%.

- Vinyl Composition Floor Tile.
  - Vinyl Composition Tile shall conform to the most recent edition of ASTM F1066.
  - Minimum nominal thickness: XXX mm.

- Resilient flooring for laboratories.
  - Resilient flooring for laboratories shall conform to the most recent edition of XXX.
  - Minimum nominal thickness: XXX mm.

4. Design & Execution
- Installation of all finish flooring materials shall be made prior to any room fitting installations, millwork, etc...
- Terminate flooring at centre line of door openings where adjacent floor finish is dissimilar.
- Perimeter edges shall be sealed at walls.
- Installation shall be as per manufacturer’s written recommendations.
- Ensure that the manufacturer’s recommendations are followed with respect to:
  - relative humidity of the subfloor
  - moisture vapour emission rate of the subfloor
  - alkalinity of concrete subfloors
  - room temperature and relative humidity
  - any other environmental conditions that may affect the performance of the flooring material.
- Specify that materials are stored for three days prior to installation in area of installation to achieve temperature stability.
- Specify that ambient temperature required by adhesive manufacturer is maintained three days prior to, during, and 24 hours after installation of materials.

5. Warranty
- Specify a 5 year manufacturer’s warranty covering materials and installation.
Wood Flooring

1. General Requirements
   - Wood flooring may be considered for use only in low-traffic areas.

2. Reference Standards
   - Wood flooring materials & installations shall conform to the most recent edition of the following standards, as applicable:
     - NOFMA - National Oak Flooring Manufacturers Association - Installing Hardwood Flooring.
     - NOFMA - National Oak Flooring Manufacturers Association - Finishing Hardwood Flooring.
     - WSFI (Wood and Synthetic Flooring Institute) - Recommendations for the Correct Preparation, Finishing, and Testing of Concrete Subfloor Surfaces to Receive Wood Flooring.
     - Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.

3. Products & Materials
   - Wood flooring shall be Grade “Select” or better.
   - Wood flooring shall be minimum 18mm thick, 89mm wide, tongue and groove profile.
   - The following types of wood flooring are acceptable:
     - Solid hardwood
     - Engineered hardwood with a minimum 6mm thick top hardwood veneer.
     - Bamboo composite.
   - Wood flooring shall be kiln dried to a maximum moisture content of 8%.
   - Wood flooring shall be finished with a minimum of three coats of polyurethane satin finish, site or factory applied.
   - Consideration shall be given to the specification of FSC (Forest Stewardship Council) certified wood.

4. Design & Execution
   - Specify a 6 mil polyethylene sheet vapour barrier under wood flooring installed over a concrete slab.
   - Wood floors installed in sports facilities shall be designed to suit the specific purpose intended.
   - Specify wood & agrifibre products that contain no added urea-formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.4.
C3029 Terrazzo & Polished Concrete Flooring

1. Reference Standards
   - Terrazzo & polished concrete flooring materials & installations shall conform to the most recent edition of the following standards, as applicable:
     - ASTM A185/A185M - Steel Welded Wire Reinforcement, Plain, for Concrete.
     - ASTM C33 - Concrete Aggregates.
     - ASTM C150 - Portland Cement.
     - ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
     - CAN/CGSB-51.34 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
     - CSA A3000 - Cementitious Materials Compendium.
     - TTMAC (Terrazzo Tile and Marble Association of Canada) Maintenance Guide.

2. Products & Materials
   - Terrazzo:
     - Specify resinous matrix terrazzo, except where Portland cement terrazzo is required to match existing flooring.
     - Epoxy Matrix: Two component resin and epoxy hardener with mineral filler and colour pigment, non-volatile, thermo-setting.
     - Polyacrylate Matrix: Resinous composition for modifying cement, containing colour pigment, non-volatile.
     - Polyester Matrix: Two component resin and hardener with mineral filler and colour pigment, thermo-setting.
     - Portland Cement: to CSA A3001, modified to TTMAC higher compressive strength requirements; obtained from single source. White or grey colour for topping mix, chosen to suit aggregate colour.
     - Colour Pigments For Topping: Non-fading mineral type.
     - Terrazzo Sand: to ASTM C33. Sharp, coarse, clean, screened, and free of deleterious material.
     - Surface Aggregate: Crushed marble, granite, quartz or glass. Consider recycled aggregate.
     - Sealer: Colourless, penetrating liquid type to completely seal matrix surface; not detrimental to terrazzo components.
   - Polished Concrete:
     - Specify “Polished Densified Concrete”, defined as concrete that has been treated with a silicate densifier/hardener/sealer, then mechanically honed and polished through consecutive grits to achieve a desired level of shine.
Acceptable polished densified concrete finishing systems shall include the following, or an approved equivalent:

- Induroshine by W.R. Meadows of Canada.
- Retroplate by Advanced Floor Products.
- FGS Permashine by L&M Construction Chemicals.
- Certishine by Vexcon Chemicals Inc.

Concrete densifier/hardener/sealer shall comply with the following characteristics:

- Water-based.
- High quality penetrating solution, breathable, non-yellowing, with no visible membrane.
- Contains no solvent, VOC, or hazardous ingredients.
- Does not discolor substrate.
- As recommended by supplier of polished concrete finishing system.

3. Design & Execution

- Do not install terrazzo or concrete when temperature is below 10 degrees C or above 32 degrees C. Maintain this temperature range 24 hours before, during, and 72 hours after installation.
- Specify appropriate reinforcing mesh, divider strips, control joints, non-slip inserts, and all other required accessories.
- Do not specify integral terrazzo wall base at interior partitions.
- Specify maximum variation from level (except surfaces sloping to drain of 3 mm over 1000mm).
Ceilings are not considered essential for all areas. Provided issues of appearance, lighting, acoustic control and housekeeping may be addressed by other means, consider the omission of suspended ceilings.

Where ceilings are required, suspended acoustic ceiling tile systems should normally be employed.

Other systems and materials may be considered in public corridors, building foyers, public assembly areas, or where aesthetic considerations, functional considerations, code requirements, acoustic problems, or fire protection requirements suggest other systems.

Avoid spray-applied acoustical finishes and treatments.

The requirements for ceiling systems or materials other than suspended acoustic ceiling tile systems will be determined in conjunction with the Client Representative, on a project-by-project basis.
C3031 Suspended Acoustic Ceiling Tile Systems

1. General Requirements
   • All components shall be non-combustible.
   • Provide acoustical panel units and grid components by a single manufacturer.

2. Reference Standards
   • Suspended acoustic ceiling tile materials & installations shall conform to the most recent edition of the following standards, as applicable:
     ▪ ASTM C635 - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
     ▪ ASTM C636/C636M - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
     ▪ ASTM E1264 - Classification of Acoustical Ceiling Products.
     ▪ CISCA (Ceilings and Interior Systems Contractors Association) - Acoustical Ceilings: Use and Practice.
     ▪ Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.

3. Products & Materials
   • In areas of high humidity, select appropriate, non-corrosive materials.
   • For renovation projects, tile specification may be modified to match existing.
   • Standard acoustical panels:
     ▪ Standard panels to be specified for general applications.
     ▪ Surface Texture: Medium
     ▪ Composition: Mineral Fiber
     ▪ Color: White
     ▪ Size: 610mm x 610mm X 16mm.
     ▪ Edge Profile: Angled tegular for interface with 24mm exposed tee.
     ▪ Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.50 - 0.60.
     ▪ Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, min. 33.
     ▪ V.O.C.'s: No added formaldehyde, free of formaldehyde-based resins, as defined by CHPS Section 01350 Protocol.
     ▪ Recycled Content: minimum 50% recycled content.
     ▪ Flame Spread: ASTM E 1264; Class A (UL) or as required by code.
     ▪ Smoke developed: as required by code.
     ▪ Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: min. 0.84.
Antimicrobial Protection: Resistant against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.


Upgraded acoustical panels:
- Upgraded panels to be specified for corridors, lobbies, high-profile spaces and any areas where a higher light reflectance or acoustic absorption are required.
- Surface Texture: Perforated
- Composition: Mineral Fiber
- Color: White
- Size: 610mm x 610mm X 16mm.
- Edge Profile: Angled tegular for interface with 24mm exposed tee.
- Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.70.
- Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, min. 35.
- V.O.C.’s: No added formaldehyde, free of formaldehyde-based resins, as defined by CHPS Section 01350 Protocol.
- Recycled Content: minimum 70% recycled content.
- Flame Spread: ASTM E 1264; Class A (UL) or as required by code.
- Smoke developed: as required by code.
- Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: min. 0.90.
- Antimicrobial Protection: Resistant against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

Acoustical panels for wet labs:
- Surface Texture: Smooth
- Composition: Mineral Fiber
- Color: White
- Size: 610mm x 610mm X 16mm.
- Edge Profile: Angled tegular for interface with 24mm exposed tee.
- Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.
- Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
- Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton N/A.
- V.O.C.’s: No added formaldehyde, free of formaldehyde-based resins, as defined by CHPS Section 01350 Protocol.
- Flame Spread: ASTM E 1264; Fire Resistive
- Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.80.
- Antimicrobial Protection: Resistant against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
- Acceptable Product: Armstrong Clean Room VL 868, CGC CleanRoom 56099, CertainTeed/Celotex Enviroguard 1192-CRF-1.

Suspension System
- Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized steel as per ASTM A 653. Main beams and cross tees are double-web steel construction with 24mm exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching.
- Splices to be integral and reversible, cross tee interlocking into main tee.
- Structural Classification: ASTM C 635, Heavy Duty.
- Color: Low sheen satin white, unless otherwise agreed.
- Acceptable Product: 24mm exposed tee, as recommended by acoustic panel manufacturer.
- High Humidity Finish: Comply with ASTM C 635 requirements for Coating Classification for Severe Environment Performance where high humidity finishes are indicated.
- Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
- Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer’s standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

- In areas requiring upgraded aesthetic treatment, fire resistance, acoustic performance or light reflectance, other products may be considered in consultation with Facilities Management Division.

4. Design & Execution
- Suspension system and panels shall be installed in accordance with the manufacturer’s instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
- Provide edge molding at intersection of ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
- Provide hanger wires spaced maximum 1200 on center.
• Light fixtures should be suspended and supported independently of the tile support grid.
• Concealed damper operators, valves, and other service check locations should be marked (usually with a small sticker/symbol) applied to the ceiling grid.
• Support systems shall permit access to ceiling spaces, without damaging tiles, particularly where necessary to access mechanical equipment.
• No powder-activated anchors will be used for any installations.
• Sprinkler heads shall be located in the center of a ceiling tile.
• Do not proceed with installation of ceiling tiles until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.
• Layout of acoustical units shall have equal border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders.

5. Warranty
• Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels and grid system components that fail within the warranty period. Failures include, but are not limited to:
  ▪ Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
  ▪ Grid System: Rusting and manufacturer's defects
• Warranty Period:
  ▪ Acoustical panels: One (1) year from date of Substantial Performance of the Work.
  ▪ Grid: Ten (10) years from date of Substantial Performance of the Work.
C3040 Painting

1. General
   • This section describes the University’s standards and guidelines with respect to interior and exterior paints, stains and coatings.

2. Reference Standards
   • Painting materials & application shall conform to the most recent edition of the following standards, as applicable:
     - SSPC (The Society for Protective Coatings) (formerly SSPC - Steel Structures Painting Council) - Steel Structures Painting Manual.
     - Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.

3. Products & Materials
   • All materials, preparation and workmanship shall conform to requirements of the latest edition of the Architectural Painting Specification Manual by the Master Painters Institute (MPI) (hereafter referred to as the MPI Painting Manual) as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.
   • All paint manufacturers and products used shall be as listed under the Approved Product List section of the MPI Painting Manual.
   • Specify low-VOC paints and coatings, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.2.
   • All paint products shall meet the MPI Green Performance™ Standard GPS-1, including requirements for performance, chemical component restrictions, and maximum allowable limits of Volatile Organic Compounds (VOCs).
   • Products meeting the MPI Green Performance™ Standards (GPS-1 & GPS-2) are listed at www.specifygreen.com and at www.paintinfo.com.
   • All materials used shall be premium grade, selected from the MPI Specifications Manual.
   • Provide the following paint finishes:
     - Ceilings: matte finish.
     - Interior gypsum board: satin finish for change rooms, washrooms, service rooms, storage rooms, and any other areas subject to moisture. Eggshell finish for all other areas.
     - Interior concrete & masonry (where required): semi-glass finish for change rooms, washrooms, service rooms, storage rooms, and any other areas subject to moisture. Satin finish for all other areas.
     - Interior concrete floors: semi-gloss finish.
     - Interior steel door frames: satin finish.
     - Exposed interior steel structure: satin finish.
• Exposed exterior steel structure: semi-gloss finish.
• Exposed ductwork & conduit: matte finish.

4. Design & Execution

• Painted surfaces are to be kept to a minimum. Where possible, employ pre-finished materials, or materials which wear naturally and do not require paint.
• Conform to applicable code for flame and smoke rating requirements for finishes.
• Each coat of interior paint should be of a different shade for ease of checking.
• In addition to choosing colours for their aesthetic values, functional worth should also be considered, for such things as defining boundaries, emphasizing changes, improving illumination (as distinct from lighting), focusing attention, setting moods and clarifying direction.
• Paint work shall be executed in accordance with the Master Painters Institute (MPI) *Painting Manual* requirements.
D. Services - Conveying Systems

D10 Conveying Systems

D1010 Elevators

1. General Requirements
   • This section describes the University’s standards and guidelines with respect to passenger, service and freight elevators.
   • Elevator systems will be chosen on a case-by-case basis, and in accordance with the recommendation of the Consultant.
   • Where practical, elevators should be designed as passenger/service type to serve as many functions as possible.
   • Unless otherwise instructed, elevators shall be installed in all buildings two stories and higher.

2. Reference Standards
   • All equipment, materials & installations shall conform to the most recent editions of the following codes and standards, as applicable:
     • CSA B651 - Accessible Design for the Built Environment.
     • CSA B44/B44S1 - Safety Code for Elevators.
     • CSA B44.1 - Elevator and Escalator Electrical Equipment.
     • CSA CAN4-S104-M - Fire Tests of Door Assemblies.
     • CSA CAN4-S105-M - Fire Door Frames.
     • National Building Code of Canada.
     • Saskatchewan Passenger and Freight Elevator Act.
     • Saskatchewan Passenger and Freight Elevator Regulations.
     • Saskatchewan Uniform Building and Accessibility Standards Act.
     • Saskatchewan Uniform Building and Accessibility Standards Regulations.

3. Products & Materials
   • The following elevator contractors are approved for use on University Projects:
     • KONE Inc.
     • Otis Canada Inc.
     • Schindler Elevator Corporation
     • Thyssen Krupp Elevator Co.
   • Elevator fixtures, equipment and finish materials should be vandal-resistant, durable and requiring minimal maintenance and custodial attention.
- Elevator fixtures & equipment:
  - Operating and signal fixtures: vandal-resistant, LED illuminated, with brushed or satin finish stainless steel faceplates.
  - Specify tamper-proof fasteners for all operating and signal fixtures.
  - Operating panel to contain: call buttons, door close button, door open button, emergency call button, telephone activation button, keyed run/stop switch. Emergency call button should be connected to a bell that serves as an emergency signal.
  - Specify a lockable service cabinet containing: fan switch, light switch, independent service switch, emergency light test switch, inspection keyed switch, 110 volt power outlet. Service Cabinet Lock to be keyed according to the University key shop’s instructions.
  - Specify direction lanterns for all elevator entrances.
  - Specify digital position indicators for the main floor elevator entrance.
  - Specify one set of protective cab pads and pad hooks for at least one elevator in each building.
  - Specify a two-speed exhaust fan in all elevators, maximum noise level of 60 Dba.
  - Specify emergency battery-powered cab lighting in all elevators.
  - Specify a hands-free, barrier-free emergency voice communication system in all elevators.

- Elevator finish materials - Passenger Elevators:
  - Landing door panels & frames: type 304 brushed or satin finish stainless steel.
  - Cab door panels & frames: type 304 brushed or satin finish stainless steel, or rigidized stainless steel, pattern to be chosen by the Consultant, and approved by Client Representative.
  - Cab ceiling: at the discretion of the Consultant, to be approved by Client Representative.
  - Cab Walls: raised removable plastic laminate panels, with brushed or satin stainless steel reveals. Plastic laminate to be chosen by the Consultant, and approved by Client Representative.
  - Cab Handrails: standard 1.5” tubular stainless steel on all non-access walls.
  - Cab Kickplate: type 304 brushed or satin finish stainless steel.
  - Flooring: non-slip, sheet linoleum or sheet rubber.
  - Door sill: extruded aluminum.
  - Glass: laminated safety glass.
  - Other materials may be proposed if required to match building hardware finishes, to be approved by Client Representative.

- Elevator finish materials - Passenger / Service Elevators:
  - Landing door panels & frames: Type 304 brushed or satin finish stainless steel.
  - Cab door panels: rigidized stainless steel, pattern to be chosen by the Consultant, and approved by Client Representative.
- Operating and signal fixtures: LED illuminated, with brushed or satin finish stainless steel faceplates.
- Cab ceiling: At the discretion of the Consultant, to be approved by Client Representative.
- Cab Walls: Raised removable rigidized stainless steel panels, pattern to be chosen by the Consultant, and approved by Client Representative.
- Cab Handrails: standard 4” high stainless steel flat bar on all non-access walls.
- Cab Kickplate: type 304 brushed or satin finish stainless steel.
- Flooring: non-slip, sheet linoleum or sheet rubber.
- Door sill: extruded aluminum.
- Glass: laminated safety glass.
- Other materials may be proposed if required to match building hardware finishes, to be approved by Client Representative.

- Elevator finish materials - Freight Elevators:
  - Cab door panels, landing door panels & frames: factory-applied primer & site-applied finish coat of enamel paint, colours to be chosen by the Consultant, and approved by Client Representative.
  - Cab ceiling: At the discretion of the Consultant, to be approved by Client Representative.
  - Cab Walls: prefinished in baked enamel or powder-coating, colour to be chosen by the Consultant, and approved by Client Representative.
  - Cab bumpers: two (2) 50 x 300 mm hardwood bumpers mounted on rear and side cab walls.
  - Flooring: steel checker-plate.
  - Lighting: recessed fluorescent fixtures.
  - Other materials may be proposed if required to match building hardware finishes, to be approved by Client Representative.

4. Design & Execution

- Elevator Drive Type:
  - Elevator drive type and rated speed will be determined on a case-by-case basis, depending on the size of building, expected elevator traffic, number of elevator stops, number of proposed elevators, type of proposed elevator and size of proposed elevator. The following is a general guide:
  - Hydraulic type (passenger): 4 elevator stops or less, light traffic, speed 0.5 - 0.75 m/s.
  - Hydraulic type (freight): 4 elevator stops or less, light use, speed 0.3 - 0.5 m/s.
  - Geared Traction type (passenger): 4-12 elevator stops, medium traffic, speed 1.0 - 2.0 m/s.
  - Geared Traction type (freight): 5 or more elevator stops, speed 0.75 - 1.75 m/s.
• Gearless Traction type (passenger): 12 elevator stops or more, speed 2.5 m/s and greater.

**Number of Elevators:**

- The Consultant shall make a recommendation on the number of elevators required, based on an analysis of the size of building, expected elevator traffic & building function. The following is a general guide for passenger elevators:
  - Gross building area up to 5000 s.m.: 1 elevator.
  - Gross building area 5000 - 10000 s.m.: 2 elevators grouped.
  - Gross building area exceeding 10000 s.m.: 3 or more elevators grouped.

**Elevator Size:**

- The size of each elevator should be determined on the basis of a careful analysis of all relevant factors, including: the size of building, expected elevator traffic, number of proposed elevators & building function. Many buildings at the University are designed to accommodate large pieces of equipment or furniture. Such buildings should be provided with an elevator sized to permit the installation and eventual replacement of such equipment.

- The following size requirements should be taken as a minimum. In many cases, larger elevators will be required:
  - Passenger elevators: 1360 kg Rated Net Capacity, minimum interior cab size (clear dimensions): 2030 wide x 1440 deep x 2440 high. 2744 high cab is generally preferred, where practical.
  - Freight elevators: Rated Net Capacity as required to suit expected loads, cab sized to accommodate largest object anticipated to be moved. 3050 high minimum interior clear cab height.
  - Elevator sizes should be selected from among the approved manufacturers’ standard sizes unless particular building requirements dictate otherwise.

- Confirm all elevator cab dimensions with Client Representative.

**Elevator Doors:**

- Door Type & Size - Passenger & Service Elevators: minimum clear door opening 1067 wide x 2134 high (2440 door height preferred.) Double leaf, centre-opening configuration is preferred.

- Door Type & Size - Freight Elevators: vertical sliding or bi-parting doors may be used only on dedicated freight elevators. Minimum clear door width 1830mm. Door dimensions to be selected based on anticipated freight. Vertical sliding or bi-parting doors exceeding 2440mm wide shall be power operated.

- For all elevators with automatic doors, provide an infra-red door protection system.

**Elevator Controllers & Programming:**

- A microprocessor-based control system shall be provided.

- All elevators, regardless of building height, shall be equipped with automatic Emergency Recall Operation, Phase I, as defined under CSA Standard B44, initiated by the building fire alarm system. In the event of a power outage or fire, all elevators should immediately bring all cars to the grade-level exit floor, ignoring call buttons and in-car controls. In the event that the fire alarm
is received from the floor at grade level, an alternate floor providing access to exit, such as an overhead walkway to another building, shall be used to home all cars. Elevators should then shut down with doors open.

- All elevators shall be equipped with in-car emergency service operation, Phase II, as defined under CSA Standard B44.
- Where two or more elevators are grouped, provide automatic group supervisory operation for each group of elevators, responsive to variations of traffic demand including up peak, down peak, balanced, and intermittent loads.
- Specify controller to permit interface with an external card reader system.
- Specify provision of Independent Service Operation on each elevator.
- Specify provision of Inspection Operation on each elevator.
- Specify provision of Hoistway Access Operation on each elevator.
- All elevators, regardless of building height, shall be equipped with emergency power operation, and shall be equipped with a fan and emergency lighting.
- At least one elevator shall be designated as a Firefighters’ Elevator (as defined by the National Building Code), regardless of building height.

Other Design Considerations:
- Maximise clear glazing at elevator lobbies, in order to improve sightlines with regard to personal safety.
- All passenger elevators shall be designed to be barrier-free, as defined by the National Building Code.
- At least one elevator per building shall be designed to provide exit provisions for persons with disabilities. As required by code, this car shall provide indication that it is powered from an emergency power supply.
- At least one elevator shall provide direct access to all floors of the building, including floors used exclusively for service spaces. If an elevator serves a floor used exclusively for service spaces, provide a keyed switch to access that floor.
- Stair access (not ladder access) shall be provided to any floor or roof level containing an elevator machine room.

5. Submittals for Review
- Specify that the following is provided to the University following award of the Contract and prior to the commencement of work, for review:
- Copies of all submissions to regulatory authorities.
- Shop Drawings, indicating the following information:
  - Motor and hydraulic pump, valves, controller, selector, governor and other component locations.
  - Car, machine beams, guide rails, buffers, and other components in hoistway.
  - Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
  - Individual weight of principal components; load reaction at points of support.
• Loads on hoisting beams.
• Clearances and over travel of car.
• Location of components in machine room.
• Locations in hoistway and machine room of connections for car light and telephone.
• Location and sizes of access doors, doors, and frames.
• Expected heat dissipation of elevator equipment in machine room.
• Applicable seismic design data; certified by a Registered Professional Structural Engineer.
• Interface with building security system.
• Electrical characteristics and connection requirements.
• Show arrangement of equipment in machine room so moving elements and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.

- Product Data for the following items:
  • Signal and operating fixtures, operating panels, indicators.
  • Cab design, dimensions, layout, and components.
  • Cab and hoistway door and frame details.
  • Electrical characteristics and connection requirements.
- Samples illustrating cab floor material, cab interior finishes, cab and hoistway door and frame finishes, and handrail material and finish.

6. Submittals Upon Completion
• Specify that the following is provided to the University upon completion of the Project:
  • All technical information required for maintenance of the system by University employees or a third party.
  • Operation and maintenance manuals, including technical bulletins, parts lists & exploded assembly diagrams of all assemblies. Manuals shall include spare parts lists, drawings, adjustment procedures, testing procedures, troubleshooting procedures, diagnostic instructions and recommended periodic maintenance schedules.
  • Adjusting, start-up, diagnostic and trouble-shooting manuals.
  • As-built electrical drawings, including wiring diagrams.
  • One archive copy of all software used in the control system.
  • Any special tools required for the maintenance, repair, adjustment, trouble-shooting and diagnosis of equipment.

7. Warranty & Maintenance Agreement
• Elevator systems and equipment shall be provided with a warranty, requiring that defective work be corrected within a one (1) year period after the date of Substantial Performance of the Work.

• Specify the provision of a service and maintenance agreement for elevator systems and components during the warranty period, including:
  ▪ Monthly inspection, cleaning, adjustment and lubrication of all equipment.
  ▪ Systematic examination, adjustment, and lubrication of elevator equipment.
  ▪ Maintenance of hydraulic fluid levels.
  ▪ Repair or replacement of parts whenever required. Use parts produced by the manufacturer of the original equipment. Replace wire ropes when necessary to maintain the required factor of safety.
  ▪ Performance of work without removing cars during peak traffic periods.
  ▪ Provision of emergency call back service at all hours for this maintenance period.

• Specify that an adequate stock of parts for replacement or emergency purposes is maintained locally.

• Specify that maintenance work is performed using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer.

• Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.
D1015 Wheelchair Lifts

1. General Requirements
   • This section describes the University’s standards and guidelines with respect to vertical and inclined wheelchair lifts.
   • Lift systems will be chosen on a case-by-case basis, and in accordance with the recommendation of the Consultant.
   • Lift systems are to be used only where ramps or passenger elevators are not practicable.

2. Reference Standards
   • Retractable partitions (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - CSA B651 - Accessible Design for the Built Environment.
     - CSA B44/B44S1 - Safety Code for Elevators.
     - CSA B44.1 - Elevator and Escalator Electrical Equipment.
     - Saskatchewan Passenger and Freight Elevator Act.
     - Saskatchewan Passenger and Freight Elevator Regulations.
     - Saskatchewan Uniform Building and Accessibility Standards Regulations.

3. Products
   • Lift fixtures, equipment and finish materials should be vandal-resistant, durable and requiring minimal maintenance and custodial attention.
   • Lift fixtures & equipment:
     - Operating and signal fixtures: vandal-resistant, LED illuminated, with brushed or satin finish stainless steel faceplates.
   • Lift finish materials:
     - Platform Finish: to be determined by Consultant.
     - Pedestrian Hand Rail: type 304 brushed or satin finish stainless steel.
     - Grab Rail: type 304 brushed or satin finish stainless steel.
     - Other materials may be proposed if required to match building hardware finishes, to be approved by Client Representative.

4. Design & Execution
• Design and fabricate lift to manufacturer’s standard design for indoor or outdoor locations, as required.

• Specify keypad locked controls, with a standard keyed over-ride switch.

5. Warranty

• Specify a manufacturer’s warranty against defects in materials and workmanship for a period of 3 years.
D1020  Escalators & Moving Walks

1. General Requirements
   - Escalators and moving walks are not approved for use, unless otherwise agreed.

D1030  Material Handling Systems

1. General Requirements
   - Requirements for material handling systems will be determined on a case-by-case basis.
D. Services - Mechanical Services

1. General

- In addition to the information contained here, Consultants are directed to refer to the University’s Mechanical Master Specification, which is available from the University Mechanical Engineer upon request.

- Refer also to Part 5, Section 5.19 - Mechanical & Electrical Equipment Rooms.

- The point of entry of utilities to the Building should typically be selected to minimize the length of the connections back to the utility mains. Final locations will be determined in consultation with Facilities Management Division. Responsibility for extension of utilities will be determined on a project-by-project basis.

- In general, all building equipment should be accessible for servicing, repair or replacement as necessary. This implies not only provision of access panels or doors, but also room within which to work provided in locations where access will not be an unnecessary hardship. All moving parts, including damper operators, shall be accessible for servicing. In locations other than occupied spaces, ladders and work platforms should be provided for elevated equipment. Wiring for equipment should, where possible, be run overhead in conduit rather than embedded in floors. Equipment should not, as a matter of practice, be located on roofs; however, this location would be preferable to an inaccessible interior location. Permanent access to roof-mounted equipment shall be provided; preferably from inside the Building. Where equipment is located in a shallow crawl space, access to equipment should be provided, if necessary, by means of excavated walkways.

- For aesthetic reasons, careful consideration should be given to the design of rooftop ducts, vents and other equipment.

- In equipment rooms, floor-mounted mechanical equipment should be set on concrete housekeeping pads. Where duct work or piping passes through floors above occupied spaces, pipe or concrete curb weirs should be provided. In large mechanical rooms provide adequate floor drains to accommodate future equipment drains and help contain floods. Generally, basement (above sewer) or ground floor mechanical rooms are preferable to locations above occupied spaces for both noise and leakage / spill reasons. Penthouse locations are preferred for air handling systems to avoid problems when night shut down of fans is to be carried out. All exposed plenums and duct work in equipment rooms are to be painted.

- To ensure that furniture layouts are free of restrictions and interferences, it is essential to show proper scale of all mechanical and electrical equipment on the drawings (for example - convectors that take up floor and wall space in the occupied zone).

- Insert information on metering.

2. Specification of Mechanical Equipment

- It should be noted that varying qualities of similar equipment exist and the Consultant should exercise great care in accepting or rejecting items as equivalent to those specified. In the past, this has sometimes not been done, resulting in the installation of inferior products with subsequent disastrous, costly results. The Facilities Management Division Mechanical Engineer should be consulted if any question as to the acceptability of a product exists. When "equivalents" are listed in the specification, actual product models or types should be included, not just the manufacturer's name.
Where specialty equipment not normally within the expertise of local Mechanical Contractors is to be installed, start-up and/or installation by factory-trained representatives should be specified.

Detailed parts lists for all equipment, with exploded views and part numbers, shall be provided for in the Contract. This information shall be sufficiently complete to permit the Owner to order any repair component without making further reference to the manufacturer or supplier.

3. Noise and Vibration Control

- In general any vibrating equipment (mechanical, electrical and other) shall be provided with isolation treatment, and any other equipment requiring special acoustic treatment should be properly accommodated.
- Equipment generating heavy vibration and/or noise should preferably be located in basements and shall be equipped with isolation or acoustic treatment as necessary.
- For roof-top mounted mechanical equipment, consider placing above corridors and other areas where a quiet environment is not critical. Avoid placing mechanical equipment above instructional spaces.
- Consider masonry construction for large mechanical shaft walls.
- No not locate mechanical shafts adjacent to instructional spaces.

4. Numbering & Labeling System for Equipment

- Develop a system of numbering for identifying equipment components which is consistent and which avoids duplications or ambiguities, particularly for Projects involving additions or alterations to existing buildings, but also for entirely new buildings. As the design of a Project nears completion and all pieces of equipment have been selected, the Consultant should consult with Facilities Management Division Engineers to receive guidance on the nomenclature and numbering system to be used in scheduling equipment. Mechanical and Electrical Consultants shall cooperate and coordinate approved naming systems, and ensure consistency on all Contract Documents. The Electrical Consultant shall specify the same equipment description used by the Mechanical for labeling of the motor control centre, starters, etc.
- All fans, unit heaters, pumps, force flow units, etc., will be labeled by the University with lamacoid plates. All fume hoods and exhaust canopies will be labeled with lamacoid plates indicating which fan serves them. The Contractor shall temporarily label all equipment with masking tape labels from equipment descriptions and numbers provided by Facilities Management Division.

5. Duplex Equipment and Alternation of Equipment:

- The following equipment should be installed in pairs and should be alternated each cycle:
  - Sewage Pumps
  - Air Compressors
  - Condensate Pumps
  - Medical Vacuum Pumps
• Laboratory Vacuum Pumps
• Domestic Water Pressure Boosters
• Boiler Feed Water Pumps

• The following equipment should be installed in pairs and will be alternated manually on a time basis by Facilities Management Division staff:
  • Heating Zone Circulators (Radiation)
  • Glycol Preheat Circulators (Steam Converters)
  • Glycol Run-around Coil Circulators
  • Chilled Water Circulators
  • Reheat Box Circulators
  • Heat Pump Condenser Circulators
  • Heat Pump Evaporator Circulators

• Very large and very small (less than .373 kW) pumps should be installed singly with no back-up unit provided. These may include the following pumps:
  • Domestic Hot Water Circulators
  • Domestic Chilled Drinking Water Circulators
  • Cooling Tower Pumps
  • District Chilled Water Pumps

6. Pumps - General
• Pumps specified and approved for installation should be supplied from a commonly available manufacturer with replacement parts locally available when possible. On all systems, provide isolation valves adjacent to pumps to permit pump removal without total or partial drain-down of the system required.

• Pumps on water and glycol systems should be specified with mechanical seals. Provide flexible connectors on suction and discharge of all base mounted pumps. Provide isolation valves on suction and discharge of all pumps.

7. Piping Systems - General
• The University has adopted a standard Piping Identification Specification, which should be used for all buildings. Copies of the Specification may be obtained from Facilities Management Division.

• For all types of piping systems consideration should be given to providing isolation valves to permit shutting off zones, risers, floors or other logical areas without shutting off entire systems. In particular, equipment such as drinking fountains and hose bibs, should have isolation valves to permit ease of repair or removal. Where necessary, drains should be provided for draining-down isolated portions of systems.

• Careful attention should be given to piping layouts for freezable mediums, whether sprinkler lines, heating lines, hot and cold water distribution or whatever. Entrance locations and unventilated exterior wall spaces are two examples of problem areas. Close supervision during installation is necessary.
• Good quality ball valves are generally preferred over other types in both plumbing and heating applications. These valves should be easily rebuild-able.
• Strainers should always be provided in front of control valves.
• Air cushion-type expansion tanks complete with gauge glass should be provided. Pressurized diaphragm-type tanks are not acceptable. Expansion tanks should have a tire-fill valve for air charging and a compressed air line with fill chuck located nearby. A level alarm system should be provided - details are available from Facilities Management Division Engineers.

8. Insulation - General
• No insulating materials containing asbestos shall be used.
• Coat above ground chilled water pipes with an asphaltic type paint before insulating.
• Internal combustion engine exhaust systems shall be insulated only with special high temperature materials specifically intended for this type of service - an example being hydrous calcium silicate.
• Plain aluminum foil tape pre-coated with adhesive shall be specified for sealing joints on cold piping.
• No staples of any type shall be allowed for fastening pipe insulation. This shall be clearly pointed out in the Specifications so there is no room for argument from the insulating contractor at the time of construction. Alternatives to stapling shall be wiring, roping, canvassing or other method previously approved by Facilities Management Division Engineers.
1. Plumbing Fixtures
   • Refer also to Master Mechanical Specification for detailed descriptions of acceptable products.
   • To reduce potable water consumption, design plumbing systems in accordance with the most recent version of LEED® Canada-NC Water Efficiency Credits 3.1 and 3.2 (Reduce potable water consumption in a building by 30%).
   • Strategies to reduce water consumption as applicable, including items such as infrared and occupancy sensors, delayed action and automatic mechanical shut-off valves should be considered.
   • Water Closets for Public Washrooms: vitreous china low-flush wall-hung type is preferred, with open seat and top spud, exposed hand operated flushometer valve complete with ‘dual-flush’ handle. Sloan model WES-111 “Uppercut”, 6 L flush on down stroke, 4.2 L on up stroke, or approved equivalent.
   • Water Closets for Private Washrooms: vitreous china floor-mounted low-flush tank type is preferred, with open seat. Water Matrix ‘Proficency’ 3.0 litre/flush or approved equivalent.
   • Urinals: vitreous china wall-hung 0.5 Lpf urinal, with integral extended shields, back inlet and concealed supply piping. Urinals should be sensor operated, with hard wired exposed flushometer valves. Zurn Z5758 Series or approved equivalent.
   • Lavatories for washrooms: drop-in type, vitreous china vanity-mounted lavatory. Lift waste stopper is not required. Under-mount lavatories are not approved for use.
   • Faucet for washrooms: ADA compliant, sensor activated, 24 VAC, chrome-plated cast brass hand-washing faucet. Sloan ETF-600 Electronic Hand Washing Faucet or approved equivalent. Single tepid water valve.
   • Sinks (kitchen type): Insert information.
   • Wash Fountains: Insert information.
   • Drinking Fountains & Coolers: Chilled water drinking fountains, with integral bottle-filler faucet, should be provided for all buildings. The units should not protrude into circulation paths.
   • Other Plumbing Fixtures: Insert information.

2. Domestic Water Distribution
   • Provide approved back flow preventer (BFP) at the water service connection(s) to each building and at interconnections to fire suppression systems and other non-potable water systems. For buildings with only a single water supply, provide two parallel BFPs with necessary bypass valving to allow water service to be maintained while testing is being carried out. Allow for drainage during normal operation and during testing. Provide approved BFPs at all interconnections between the University water system and the municipal water system (arranged to protect the municipal system). Locate two parallel BFPs on large lines serving more than one building in a buried concrete chamber. If possible combine with the meter chamber. Provide lockable, hinged
access hatch, ladder rungs and pump-out sump. Contact FMD Planning and Development for additional requirements specific to each installation.

- Water meters (turbine type) should be provided to give accurate readings both at low and at full flows. (Note however, that fire fighting standpipes may by-pass the meter if used for that purpose only.) Water pressure will be at about 469 kPa (68 psig) but flow tests may have to be conducted in some areas to determine available pressures and design conditions for building systems.

- Water lines should be oversized for up to 50% greater future fixture unit load. This shall apply particularly in lab-type buildings where addition of extra equipment is to be expected.

- Copper piping carrying potable water shall be joined using non-lead content solders only. 95/5 tin-antimony or tin-silver or other approved solder shall be specified.

- Hot water tanks should be lined or otherwise adequately protected against internal corrosion and their piping and positioning should allow for easy removal of the coil for cleaning. Recirculation of hot water is recommended to avoid cooling in the lines, especially where hot water is not used frequently. Adequate expansion should be provided for in all hot water lines. A water softener is not required unless specifically requested.

- Wherever possible, primary cold water lines should be located away from primary steam and hot water lines. Wrought copper fittings are preferred for copper piping.

- Pressure reducing valves on domestic water systems should be specified as non-ferrous construction.

- Field constructed shock absorbers should not be specified for domestic water systems. Specify manufactured no lead content water hammer arrestors. Locations, sizes and numbers should be shown on the drawings. They should be installed in accessible locations to permit future replacement.

- Outside the Building there should be 19 mm key operated non-freeze wall hose bib faucets, compatible with Zurn key operator, supplied by 25 mm piping, near the main and service entries and at intervals around the Building. These should be placed so that it is not necessary to lay hoses across walks or roads or use lengths in excess of 50 m to reach all landscaped areas. Mounting height should be convenient in relation to finished landscape levels.

3. Sanitary Waste

- Drain lines should be oversized for up to 50% greater future fixture unit load. This shall apply particularly in lab-type buildings where addition of extra equipment is to be expected.

- Floor drains should be all cast iron construction except for floor rings and strainers which should be bronze. No aluminum or alloy construction is permitted.

- Removable traps shall be provided on all sinks with a means for clean out.

- Cement pipe used for above grade drainage systems should incorporate the necessary hangers, thrust blocks and tie rods to ensure that “Ring-Tite” joints will not rupture during heavy load conditions. Specify joint clamps such as White Pipe of Canada Ltd. double retaining hangers for all horizontal joints and a similar clamping system for all vertical joints. Specify heavy clamps and tie rods at elbows and branch connections. Provide removable retainers for clean out plugs. When systems are complete they should be tested full of water to a pressure of 90 kPa.
• Building drains should always intercept sewer mains at a new or existing manhole to permit easier clean out.

4. Rain Water Drainage
• Roof drains should be all cast iron construction including flashing clamps and domes.
• There is to be no mixing of materials except for ballast guards which should be stainless steel.

5. Other Plumbing Systems
• Compressed air systems (laboratory or instrument) shall be run in copper piping to suit working pressures. Iron pipe shall not be used. It should be noted that sophisticated laboratory equipment often requires high air quality levels. Laboratory air systems should be equal in all respects to control air systems (refer to requirements in Part 6, Section D30 HVAC).
1. General

- The recommended design environment is 21° C, 50% RH (no condensation) and dew point 10° C. The maximum deviations allowable from these optimum conditions would be +3° C and +10% RH (no condensation). Temperature and humidity rates of change shall be limited to 3° C/hour and 6%/hour respectively.

- Sheet metal convector enclosures should be extra heavy gauge and reinforced to prevent buckling. To save costs, consideration might be given to using industrial rather than institutional types of heating units in certain areas.

- Where large doors are installed, such as at the service entry, prevent the entry of cold air by blanketing or blowing warm air against the opening.

- The thermostat and heating in entrance vestibules shall provide fast response and fast make-up to compensate for door opening. Forced-flow steam or glycol heaters are preferred for this reason. If possible, heating should be directed along the floor rather than introduced high up on the walls or ceiling. Attention should also be given to prevention of sprinkler or other piping freeze-up near entrances. Humidity should be kept low in winter.

- If radiation heating elements must be located behind built-in furniture or cabinets, large removable access panels should be provided for servicing—regular small access doors are not acceptable. Control valves, vents, isolation valves, etc., should be located above accessible ceilings where possible.

- In the event of a power failure, (which does not necessarily mean there is simultaneously a steam failure), it would be desirable to have a heating system which could emit ten to twenty per cent of its rated capacity via gravity circulation.

- Overheating of occupied spaces has occurred in the past where such spaces are located above or adjacent to hot equipment rooms or service tunnels. Temperatures in equipment rooms should be maintained at a reasonable level; any excess heat should be reclaimed for use elsewhere whenever possible.

2. Steam Heating Systems

- Steam force-flow and unit heaters should be installed with a two position control valve operated by a thermostat. An aquastat located on the condensate line should cycle the fan and act as a low limit protection device. Where it is absolutely necessary to lift condensate out of a heater, no control valve should be used. Instead these units should be on a steam line with a CCMS control valve that will be closed in warm weather.

- Steam delivery pressure to the Building will be approximately 952 kPa (138 psig). Piping, fittings, etc., on the high pressure side of the pressure reducing station are to be selected for 2068 kPa (300 psig) service.

- The pressure reducing station is to be located as close to the steam entry point as possible and in a location where the noise will not be objectionable. Steam pressure reducing stations should consist of a single industrial grade control valve with equal percentage trim—selection assistance will be provided by Facilities Management Division Engineers.

- Relief lines from all safety relief valves on steam pressure reducing valve stations should be carried to atmosphere above the roof. Each of the heating, ventilating,
domestic hot water and steam systems should be on an individual branch with its own clearly identified isolating valve.

- Wrench operated blow-down valves with screw caps should be installed on all dirt pockets and strainers.

- Two condensate return pumps should be used, alternating in operation. The condensate receiver should have an emergency drain connection to the sewer which is above the normal operating level of the receiver, but below the lowest heating coils in the ventilation system. Medium and high pressure drips should not be led directly to the condensate system. A metric reading condensate meter should be provided (steam flow meters may be used for high demand cases). A balancing cock should be installed between the condensate pump and the meter (to be adjusted to eliminate excessively high flow rates through the meter when pressures are low in the Campus condensate return system).

- If steam with a pressure above 103 kPa is used for heating or any equipment which returns condensate to the system, a flash tank for reducing the condensate to atmospheric pressure must be provided. Also, the system must be designed so that all the low pressure steam produced by this flashing action is completely used. No steaming vents will be allowed.

- Small bypass lines should be provided around large steam isolation valves to permit gradual warm-up of large steam lines.

- On steam service lines externally pressurized guided bellows-type expansion joints should be specified. Units with no mounting base and weld-type ends are preferred. Units may be selected for operation below 1034 kPa.

- Traps on high pressure steam service should be true balanced vapour-pressure fill thermostatic bellows traps or inverted bucket traps. Information on such traps is available from Facilities Management Division Engineers.

3. Fluid Heating & Cooling Systems

- The piping arrangement for fluid heating systems should be such that portions of the system can be isolated for servicing without the requirement to shut down the entire system. Cocks are too susceptible to leakage and should not be used in any fluid heating circuits. Where steam mains are fed through buildings the configuration should be such that they may be shut off during non-heating seasons.

- For hot water heating systems, designers shall indicate flow quantities on drawings to assist in balancing.

- Glycol systems should be provided with a fill and pressurization pump system which incorporates a large metal drum to permit retention of blown off glycol. A detail for the recommended configuration of this system is available from Facilities Management Division.

- All buildings shall be connected to the central chilled water system, unless otherwise directed by Facilities Management Division.

- The central chilled water system is in operation during the months May to September only. The characteristics of the central chilled water system at the Building are as follows:

  - Chilled water supply temperature: 5.6°C.
- Temperature rise between supply and return: 6.7°C.
- Flow of chilled water per ton of cooling load: 0.126 l/s.
- Minimum differential head at site, to be determined in consultation with Facilities Management Division.
- Where positive tight closure is required, gate valves rather than butterfly valves should be used.
- Control of chilled water - the building designer should specify a throttling type control valve with three valve bypass to be installed on the chilled water return main. Throttling type control valves must be installed on all coils, no bypass type control valves are allowable on any chilled water piping. Drain valves should be provided to permit drainage of the Building system. Clarification on chilled water control can be obtained from University staff if required.

- For water and glycol air coils red brass tubes of at least 1.24 mm wall thickness should be specified to extend the life of these components. For all types of multi-row coils, fins are to be continuous through the total thickness of the coil. That is, multi-row coils are not to be built up from single row coils (this type of construction lends itself to plugging at each coil interface and makes cleaning nearly impossible).
- Provide filters ahead of all coils, including exhaust coils on heat reclaim run around systems. Also, access should be provided on both sides of coils to permit cleaning or repair. Heating and cooling coils should not be mounted face to face. Provide access space between coils and other apparatus for cleaning and servicing.

4. Ventilation
- The Building ventilation system shall be designed to take advantage of natural cooling by the outdoor air when temperatures are favourable.
- Ensure air change rates for all spaces conform to most recent edition of ASHRAE Standard 62 - Ventilation for Acceptable Indoor Air Quality.
- If the University Central Control and Monitoring System is to be incorporated in a building, it should be expected that various energy conserving techniques, including cycling-off fans, will be employed. If certain areas of a building must receive continuous ventilation or other special treatment due to their use, these areas should be handled by separate fan systems independent of the main systems.
- Exhaust air discharges should not be near ground level, and should not blow on the ground or on vegetation.
- Fresh air intakes should be inaccessible to potential tampering and as high up in the Building as possible above dust and ground blizzard zones. A shaded exposure is preferred for lower summer intake temperatures. Also, intake design should be such as to avoid snow being drawn into the intake allowing for potential water damage. Exhaust air, from vents or fume hoods, shall not be drawn into fresh air intakes. Intakes should also be located away from the service entrance, to avoid exhaust fumes. Coarse bird screening mesh (about 25 mm) should be provided. The potential build-up on screens of hoar frost in winter and Poplar fuzz in summer should be considered with the design. Screens should be easily accessible and readily removable from inside the building. Installation of a hinged, counterweighted portion of bird screen should be considered as a safety relief to protect against duct or plenum implosion in the event of total blockage of the inlet screen.
• Supply air registers and grilles should be selected to distribute air without obtrusive noise and shall not leak and cause smudging of walls and ceilings. With variable air volume systems, slot-type diffusers not prone to dumping at low flow rates should be specified. Door and wall grilles in the occupied zone should be rugged. In first class spaces the insides of ducts behind grilles should be painted black so the internals do not show. Duct work should include accessible test ports at suitable locations for measuring air flow, static pressures and temperatures. The exact location and number of test ports shall be determined by Facilities Management Division personnel at the time of air balancing. This work shall be included in the Contract, however.

• Provision of roof mounted fans should be avoided because of cold weather operation problems, but if unavoidable, should be direct-drive type with three-phase motors.

• Care should be taken with the use of straight variable air volume systems in areas with exterior (i.e. heating) exposures. In winter, it is very difficult to provide adequate ventilation while avoiding uncomfortable conditions. One solution which has worked well is the provision of reheat coils in all VAV terminals serving perimeter spaces. Other proposals should be discussed with Facilities Management Division Engineers before specification. It should be noted that radiation heating should still be provided in spaces served with reheat systems to allow fan systems to be cycled off.

• Plenum construction should be extremely rugged. Access doors in particular should be built for durability. Heavy commercial refrigerator door hardware is preferred.

• Belt driven fans should be complete with enclosed belt guards. Guards should be built with an opening for a tachometer at the fan shaft end.

• Balancing of ventilation systems shall be provided by the University unless specific direction is given otherwise. To assist in balancing, designers should designate air quantities in main ducts, etc. Specify balancing dampers in all duct run-outs in supply, return and exhaust systems.

• Ensure that ventilation of meeting rooms is adequate. The occupancy of these spaces can at times be very high. Where variable air volume systems are employed, use of terminal reheat coils or some other method should be specified to ensure good ventilation of lounge and meeting type spaces.

• In lab-intensive buildings, consideration should be given early in the design to centralizing fans and other equipment in service corridors or penthouses to avoid noise problems and permit ease of servicing, rather than locating numerous exhaust fans in prime work spaces or exposed on roofs.

• Where perchloric fume hoods are required, Venturi type exhausters shall be used. Exhaust duct work shall be welded stainless steel and water wash down provision shall be provided. Facilities Management Division Engineers can provide information on the standard wash down configuration and control to be specified. No organic sealers or other material shall be used in perchloric systems. Duct work shall be absolutely vertical - no offsets shall be permitted.

• Storage battery installations should be provided with exhaust hood and fan to remove charging fumes.

• Vending storage rooms into which vending machines are backed, shall have adequate ventilation or cooling provided to counteract the heat produced by the refrigeration machines in order that stored merchandise not be spoiled by overheating.

• Some exhausting capacity should be provided in third class spaces such as storerooms and caretaker’s closets, to prevent them becoming stale and musty.
- In the design of mechanical systems for computer facilities, the computer manufacturer's requirements should always be referred to; however, some general design guidelines have been determined:

- Each manufacturer should be consulted regarding the best method of air supply for his particular equipment, but raised floor plenum supply is preferable when possible. Where a raised floor supply plenum is used it should be noted that considerable restriction to air flow will be incurred due to cabling, conduits and fire suppression systems. Plenum depth of 400 mm is recommended. At least 750 mm clearance should be allowed as head room above all equipment to permit free air circulation. Air circulation should be continuous regardless of operation of the cooling compressors to prevent localized overheating.

- In computer facilities summertime humidity levels are generally low enough that sub cooling and subsequent reheating of supply air is not required to produce required humidity levels. In winter, humidification will be required. Humidifiers which spray or inject water into the air stream should not be used as they cause mineral contamination.

- Dedicated package air conditioners are generally preferred to relying on main building systems to cool computer spaces. If possible, package units should be installed in a mechanical space adjacent to the computer room for acoustic reasons and to permit ease of servicing. It is preferred that air-cooled rather than water-cooled condensing units be used when packaged air conditioning units or other refrigeration units are to be installed. Where City water is used for condenser cooling, heat reclaim should be investigated. It is not necessary to specify cooling units specifically designed for computer room cooling, complete with reheat coils, humidity alarms, sophisticated controls, etc. - standard package air conditioners are satisfactory.

5. Humidification & Dehumidification

- Summer dehumidification and winter humidification should be provided, however, precautions should be exercised in some cases to avoid condensation problems, probably by limiting the humidity. Steam grid humidification is favored for control and maintenance reasons. Humidity controls should be fail-safe (shut off steam).

- Steam humidifiers should operate from a separate steam main so that they are not shut off in summer along with the heaters, particularly where humidification is required year round for computer rooms, etc...

6. Heat Recovery Equipment

- Where large quantities of fresh air are required in the coldest weather, a heat recovery system should be used so that air change rates can be increased to good standards without requiring excessive amounts of heat for tempering outside air.

- Heat exchange wheels shall not be used. Use of glycol coils for heat transfer and for pre-heating is preferable.

7. Controls

- Refer also to part 2, Section 2.4.5 - Controls Design and Scope of Work.

- The control system should be designed with consideration for future connection to The University’s Central Monitoring and Control System. Facilities Management Division will provide assistance to ensure that systems are compatible with CCMS.
The controls of the heating and ventilating systems should be arranged so that the latter may be shut off when the Building is not in use. It is assumed that savings will justify the cost of controls in all major spaces; however, it is not desired to install them in all small rooms if not economically justified. In any event, thermostats should control temperature only for those spaces in which they are located. All thermostats should be key operated, have blank covers to prevent tampering by unauthorized persons, and should not have thermometers. They should be positioned only after the furniture and equipment have been located on the plans.

All spaces should have individual thermostatic controls. Gang control of spaces, even when spaces are similar, has not worked well in the past. Temperature control, preferably from wall-mounted thermostats, should also be provided in heated storage and janitor rooms and similar areas.

There should be means for automatically compensating heating output for outside temperature and desirably, for sun and wind exposure. Also, controls, particularly those for the ventilating system, should be designed to fail-safe in the event of a power failure in cold weather.

Use nut and ferrule connections on plastic lines or use copper lines (preferred). Where plastic lines are used they should be run in conduit or metal lay-in trays. Piping to wall mounted thermostats shall be plastic in conduit. The plastic may be exposed for up to 0.5 m from the top end of the conduit to copper tubing in ceiling spaces only. Exposed “Tygon” plastic is expected between rigid copper and the connection to a pivoted operator, but is not to exceed 0.5 m in length.

In large buildings consideration should be given to zoning the compressed air system to simplify the detection of leaks and permit partial system shutdowns. Instead of a network of piping, each zone would be separately piped and valved and terminated in a central panel. The location of main runs at least should be shown on construction and as-built drawings. The entire compressed air distribution system should be laid out on construction drawings in the form of a schematic similar to an electrical distribution schematic.

Stand-by compressors should be provided for pneumatic controls on large Projects, and control air pressure should not be taken from lab air pressure supply and vice versa. Compressors should be fitted with refrigerated air dryers, automatic moisture traps and coalescing filters to remove oil and dirt. As numerous problems have been experienced with certain types and makes of air compressors and air dryers designers should consult with Facilities Management Division Engineers before specifying a compressor or air dryer. In buildings connected to CCMS, Facilities Management Division will control compressor alternation. A detail showing the desired control and piping assembly for air compressors is available from Facilities Management Division Engineers.

Remote bulb-type thermostats should be used whenever there is a chance that a thermostat might be damaged by water or other means. This particularly applies to animal holding areas which will be hosed down as a matter of practice.

Duct-mounted controllers or thermostats which are affected by vibration are unacceptable. These should be mounted on a free standing panel.

A complete controls specification, Section 15900, has been developed incorporating University requirements, especially where CCMS is to be installed. Copies of this specification, which will be updated regularly, are available from Facilities Management Division Engineers.
D40 Fire Protection

1. Fire Protection Sprinkler Systems
   • *Section under development.*

2. Standpipes
   • Fire protection standpipe systems shall be installed in accordance with NFPA 14, latest edition.
   • Standpipes used only for fire protection may by-pass the water meter.
   • Buildings that are equipped and required to have a standpipe system shall have their hoses mounted in the cabinets as part of the system. Such systems shall be installed, maintained and tested in accordance with NFPA 25.

3. Fire Protection Specialties
   • The Consultant shall determine the number and location of fire extinguishers according to the National Fire Code of Canada, and will furnish a list of extinguishers and their locations to the Client Representative for review by the University Department of Workplace Safety and Environmental Protection (WSEP).
   • Fire extinguishers are to be supplied and installed as part of the Construction Contract.
   • Fire extinguishers shall be contained within a suitable cabinet.
D. Services - Electrical

D50 Electrical

D5000 General

- An Electrical Master Specification, incorporating University requirements, is available from Facilities Management Division upon request. Consultants are directed to refer to the Master Specification in addition to the information contained in this Manual.

- The Consultant shall exercise great care in accepting or rejecting items as equivalents to those specified, as varying qualities of similar equipment undoubtedly exist. The University has experienced problems in the past, where due consideration had not been given to this process, resulting in the installation of inferior products with subsequent disastrous, costly results. Facilities Management Division should be consulted if any question as to the acceptability of a product exists. When "equivalents" are listed in the specification, actual product models or types should be included, not just the manufacturer's name.

- Any vibrating equipment should be provided with isolation treatment, and any other equipment requiring special acoustic treatment should be properly accommodated.

- Insert information on metering.

- For Electrical Drafting Standards, refer to Appendix XXX.

- Refer also to Part 5, Section 5.19 - Mechanical & Electrical Equipment Rooms.
D5010 Electrical Service & Distribution

1. Power Supply
   - Buildings shall generally be supplied power from the University’s 25kV distribution system. System characteristics are as follows:
   - Voltage: 25 KV solidly grounded neutral, three wire distribution or as directed by the University of Saskatchewan.
   - Cables: Single conductor, cross-linked polyethylene, 133% insulation
   - Interrupting capacity @ 25 KV:
     - 3 phase fault symmetrical 2800A
     - 3 phase fault asymmetrical 4200A

2. Building Distribution
   - Generally, new services for buildings shall be 600V 4-wire at the main distribution only. The rest of the building distribution should be 600V 3-wire, as single phase loads at this voltage are undesirable. Step down transformers for lighting and general use power would optimally be located on each floor or every other floor. The use of the higher distribution voltage permits smaller conductors, and thus conduits, for existing and future loads when accessible routes are not always easy to find. This also permits large motor loads to be at this voltage and therefore reduce their starting effects on lighting and receptacle loads.
   - The power supply to the Building shall be metered using revenue-approved 3-element, demand-energy type meters with test switches. Metering shall satisfy Measurements Canada requirements.
   - In many buildings the electrical demand is increasing. The reserve allowance, exclusive of that made for future extensions to the proposed building, should not be less than 50 per cent in terms of capacity and space points in the main distribution. At 2% growth over 20 years, capacity needs to be 50% larger than design load.
   - Conduit shall not be embedded in concrete. Conduits shall be either surface mounted or concealed in wall and ceiling spaces. No metallic conduit is acceptable below slab on grade or otherwise in contact with ground water. Use Schedule 40 PVC conduit for underground conduit larger than 50 mm. All conduit runs shall contain a bonding wire.
   - Do not exceed 70% fill on panels feeding lighting and office areas. Do not exceed 60% fill on panels feeding laboratory areas. Additional conduits and conduit space should be provided to ceiling spaces both above and below panels. Conduits should be oversized for most computer and 120 V distribution and not be at capacity when a new installation is turned over to the University. The lighting and general power panels should preferably be located in corridors, so servicing and inspection can be done without interfering with the occupants. In level one and two laboratories, power panels should be located near the doorway and interior to the laboratory. In level three and four laboratories power panels should be located according to the applicable standards. All panels accessible to the public should be behind lockable covers for safety and security. Panels supplied from the emergency power system should be located in electrical rooms or other secure rooms.
   - Motor control centres shall be used to house starters and control circuits with the exception of manual starters which shall be located adjacent to the motor which it
serves. Motors larger than 1/2hp shall be three-phase and 600 V. For motors 15hp and larger consideration should be given to provide soft-start starters. The choice of starter is to be justified by duty-cycle and power system stability. Motor numbering is to be obtained from the University of Saskatchewan.

- Variable speed drives shall be used where reduced operating and maintenance costs can be realized. Drives shall be separately enclosed and located adjacent to the motor it serves. Drives up to 15 hp may be grouped together in suitably ventilated enclosures.

- In some cases, it may be necessary to ensure an uninterrupted power supply for a research project or experiment. Such cases will be noted in the Program of Requirements. Generally this equipment is deemed to not be part of the building and as such is supplied by the user of the space.
5020 Lighting & Branch Wiring

1. General
   - The Consultant should advance his proposals for lighting levels, colour and fixture schedules during the preliminary design and not leave the selection until the building is under construction.
   - In general, the design should aim to avoid the cold, stark effect of many contemporary lighting installations used in work areas.
   - When locating the fixtures the problems of lamp replacement should be considered. Gymnasiums and other large, high spaces should have catwalks so as to avoid the requirements of lifts or scaffolding for maintenance and lamp replacement. In atriums, fixtures should be so placed that scaffolding or the use of pogo sticks are not required. Placing fixtures at a more accessible level also requires less lighting for a more efficient installation.

2. Illumination Levels
   - The following illumination levels are to be provided:
     - Office 540
     - Classrooms 540
     - Auditoria 220
     - Animal rooms (general) 320
     - Corridors 110
     - Copy rooms 320
     - Carrels for Reading 540
     - Cafeteria 320
     - Computer rooms 320
     - Crawl Spaces 110
     - Dark rooms (general) 320
     - Gymnasia 320
     - Janitor's closets 320
     - Kitchens 540
     - Kitchenettes 320
     - Laboratories (general) 540
     - Laboratories (fine details) 850
     - Library stacks 220
     - Loading docks 320
     - Locker rooms 220
     - Lobbies 110
<table>
<thead>
<tr>
<th>Room Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lounges</td>
<td>320</td>
</tr>
<tr>
<td>Meeting rooms</td>
<td>540</td>
</tr>
<tr>
<td>Operating rooms</td>
<td>1,100</td>
</tr>
<tr>
<td>Offices (visual difficulty)</td>
<td>810</td>
</tr>
<tr>
<td>Photo studio</td>
<td>540</td>
</tr>
<tr>
<td>Parking Structures</td>
<td>50</td>
</tr>
<tr>
<td>Reading rooms</td>
<td>540</td>
</tr>
<tr>
<td>Reading rooms (fine reading)</td>
<td>810</td>
</tr>
<tr>
<td>Reception areas</td>
<td>320</td>
</tr>
<tr>
<td>Service Spaces</td>
<td>320</td>
</tr>
<tr>
<td>Storage</td>
<td>110</td>
</tr>
<tr>
<td>Shops (general)</td>
<td>540</td>
</tr>
<tr>
<td>Stairs</td>
<td>110</td>
</tr>
<tr>
<td>Washrooms</td>
<td>220</td>
</tr>
<tr>
<td>Working storage</td>
<td>320</td>
</tr>
</tbody>
</table>

3. **Interior Lighting**

- Standard incandescent lighting is not permitted. Special use incandescent lamps should be kept to a minimum and used only where other lighting technology is not available.

- The variety of lamp types required should be no greater than necessary, and unless special circumstances warrant otherwise, should be restricted to the common types and sizes. Storage space in the caretaker's closets should be designed to suit the types and quantities of lamps to be used.

- Fluorescent lighting standard: 1 x 4 fluorescent fixtures utilizing two T8 lamps with 4100°K temperature and CRI of 80 or better.

- Fluorescent ballasts should be two lamp for linear systems and 120 V for all types. Provide programmed start ballasts where occupancy sensors are used. Dimming fluorescent ballasts should be continuous (0 - 10 VDC) or bi-level.

- HID ballasts should be rated 120 V or 347 V as required by the quantity. Ballasts should be remotely located where accessibility is difficult, where a quieter space is desired, or where grouping permits more efficient maintenance.

- Switching for lighting systems should generally be 120 V line switching. The use of low voltage switching should be limited to multimedia consoles, photocell controlled lighting or other special installations. Low voltage switching is not cost effective in small areas and, in large areas maintenance is difficult due to the large number of fixtures on a circuit. Generally, a few switches in classrooms are able to provide sufficient control over the light level.

- Dimming of lighting should only be provided where zoned light switching is not adequate. Limit dimming to large theatres and assembly facilities with projectors, some daylight harvesting spaces or, as specifically required by the space function. Use in other spaces may be considered, subject to approval by Facilities Management Division.
Occupancy sensors should be provided as identified in the functional space categories. In offices and other single occupancy spaces, lights should be manually turned on. Lights should shut off automatically after 15 minutes. Where possible, sensors should be wall mounted. Care must be taken when locating sensors to ensure that the complete space is in the sensor range. Avoid using an excessive number of sensors.

Daylit areas should usually be controlled by photocells and/or timers. The transition in light level should not be an issue as most daylit spaces are circulatory. Daylight harvesting in small spaces such as personal offices is not recommended as maintenance is an issue. Provide continuous dimming only in larger, assembly occupancies where a stepped transition in light level could be bothersome.

Scheduling of lighting shall be determined on a project basis. Some buildings have occupants at all hours. Consideration must be given to the perception of personal safety.

Automatic lighting controls shall be compatible with the building control system as occupancy sensors may also adjust air flow to a space. The lighting controls should remain independent from the building control system so that one can function without the other.

4. Exterior Lighting

- Luminaires should be located at all building entrances and exits. Architectural or other building feature lighting is undesirable as it contributes to light pollution, is generally not useful lighting and is inefficient due to dirt/snow accumulation.

- Exterior lighting is to be 120 V high pressure sodium. Given the speed with which new products are available or improvements to existing products are made, consideration will be given to other lighting technologies not identified here.

- Luminaires on buildings should be low glare and have controlled cut-off lenses. Lights should be on separate circuits from other building services but may be on the same contactor and photocell as street lighting if they are located within the building.

- Exterior lighting for roads, walks and parking is to be the standard University fixtures. Walkway lighting is to have 100 W lamps on 10’ aluminum poles. Road and parking lighting are to have 250 W lamps on 20’ aluminum poles. Lighting is to be controlled by a contactor and photocell on either an existing circuit or a new circuit. New circuits shall be sized for future growth and shall be obtained from an adjacent building or parking lot. Contactors shall have a hand-off-auto switch for maintenance of the lighting system.

5. Emergency Lighting

- Emergency lighting shall be provided to University standards, which in some areas exceeds that required by the National Building Code. Generally lighting should be provided for access to exits and adjacent equipment on emergency power. Theatres with tiered seating, some wet labs, and fume hoods should all have emergency lighting. Emergency lighting in entrances, corridors, stairwells and washrooms should be unswitched. Fume hood lighting may be switched.

6. Lighting for Service Spaces

- Provide locally switched compact fluorescent lighting in mechanical duct systems, at filter locations and near mechanical units where frequent maintenance will occur.
7. Convenience Receptacles

- Provide fluorescent lighting in crawl spaces.

- As a general rule, electrical receptacles should be spaced approximately every 3600 mm around the walls in all offices and work rooms. Receptacles should not be mounted back to back. Classrooms will normally require one receptacle at the back of the room, and one or more at the front near the lecture station. Refer also to Section XXX for multimedia requirements. Some work areas will require a higher incidence than this and these cases will be noted in the Requirement Study.

- Receptacles shall be mounted at a height of 450mm above finished floor, except in work areas where a mounting height of 175 mm above the work surfaces shall be considered. Placement of all receptacles should be checked for co-ordination with loose furnishings when the room elevation detail work sheets are available.

- Receptacles are needed in lobbies and corridors in sufficient numbers to require no more than a 15 m cord for power-driven housekeeping machines. These receptacles should be 15/20 amp T-slot type and not be on the same circuit with receptacles in user spaces. Provide one of these receptacles near in each caretaker’s closet.

- All offices should have two duplex receptacles on separate circuits adjacent to the desk location and one on the opposing wall. The receptacles should be spaced, in separate boxes, at least 150 mm centre to centre and not installed in one 4 x 4 box.

- No more than four receptacles should be on one circuit.

- Provide receptacles on separate circuits for vending machines, refrigerators and freezers.

- In computer and other labs no more than three (3) receptacles should be on one circuit.

- Provide two split duplex receptacles for the kitchenette areas.

- Provide power receptacles in ceiling and crawl spaces where equipment requiring maintenance is located.

- Provide a 208V - single phase - 50 amp welder receptacle in mechanical rooms.

- Provide a receptacle in the mechanical duct systems at filter locations.

- Provide weatherproof receptacles along exterior building perimeter as indicated in the Requirement Study. As a minimum provide a receptacle adjacent to building entrances.

- Ground fault receptacles shall be provided in all change and locker rooms with shower facilities.

- Special features such as isolated ground, surge suppression or labels of “computer use only” are not required unless specifically noted in the Requirement Study.
D5030 Communication & Security

1. Public Address & Music Systems
   - Section Under Development.

2. Intercommunication & Paging Systems
   - Section Under Development.

3. Telephone Systems
   - The use of traditional 2-wire telephone or voice-over-internet-protocol (VoIP) should be determined at the start any Project. This assessment will be carried out by University of Saskatchewan Telephone Services, and will be requested by the Client Representative.
   - The number and location of telephone outlets that will be required will be determined by the Consultant, and will be reviewed and approved by the Client Representative.
   - In general, it is the University's practice to provide for a telephone in each office and outlets in classrooms, laboratories and in other specific areas where communication facilities may be required.
   - In most buildings provision should be made for public pay phones in a readily accessible and easily found location. Provision for such phones need only allow for two, but at least one should be wheelchair accessible.

4. Assistive Hearing Systems
   - In all instructional spaces, specify high frequency infrared Assistive Hearing Systems to provide headphone-based sound reinforcement for those with hearing impairments.
   - Standard for Assistive Hearing Transmitters is the Sennheiser SZ series of 2.3 MHz Infrared Emitters. There are a number of types of compatible transmitters in this series and the specific model is selected based on current models and required coverage area. The EMAP unit will provide specific transmitter recommendations based on the characteristics of the area to be served.

5. Clock Systems
   - Provide clocks only as requested in the Room Requirement Study.
   - Clocks are to be battery operated or an expansion of an existing clock system.

6. Fire Alarm Systems
   - The fire alarm system shall provide general alarm, addressable, non-coded, single stage, supervised, and closed circuit fire alarm equipment. The control panel shall be intelligent and addressable with individually identifiable and controllable detection/control points. The system should be CSA and ULC approved and should meet all the requirements of the National Building Code and the local authorities having jurisdiction.
• The main control panel shall be located in the main electrical room. Annunciator panels shall be located at all fire fighter entrances. All panels shall have a liquid crystal display to indicate all status, trouble and alarm messages. Annunciator panels shall also include a remote signal silencing switch and a reset switch. The panel shall have a hinged lockable glass door, keyed with the same key as main panel.

• The complete system will be supplied emergency power from a point as near as practical to the emergency power source. The main panel shall contain sufficient battery power for the entire system for a period of 24 hours (confirm) in the event of a complete loss of power.

• Devices shall be wired but not necessarily conduited, Class A. A minimum of two loops shall be provided in any building. Loops shall have a sufficient number of isolating modules so as to not leave an area without protection in the event of a ground, short circuit or open circuit in the loop.

• Signal circuits shall provide both audible and visual (strobe) alarm. A minimum of two circuits shall be provided in any building. The system should be designed such that every floor is covered by at least two circuits. Each signal circuit should be equipped with a bypass switch for maintenance and testing purposes. A circuit in bypass shall indicate a trouble at the main control panel and Central Heating Plant.

• System devices to be identified according to University nomenclature.

• A minimum of four auxiliary relays are required for:
  - Central building control and monitoring system (CCMS)
  - Door hold open devices
  - Elevators
  - Fan shut down

• One relay shall be provided for each elevator.

• Each relay shall provide two form C dry contacts rated for 5 amperes and shall operate when any alarm is received. Each relay shall be equipped with a bypass switch for maintenance and testing purposes. A relay switched to bypass shall indicate a trouble at the main control panel and Central Heating Plant.

• A fire department connection shall be provided in the main control panel. Alarm and trouble signals from the protected property shall be transmitted to the Central Heating Plant. A manually operated disconnect which will prevent alarms from being transmitted to the Central Plant will cause system trouble and indicate trouble at the Central Plant.

• Door hold open devices shall be provided as required. Smoke detectors shall be connected to the fire alarm system. Any alarm shall cause the doors to close. Hold open devices shall be 120 V, supplied from normal power and close doors in the event of a power failure.

• In the event of a fire alarm, all elevators shall be recalled to the exit floor level. Where floor levels exist that provide an alternate exit such as to another building, this level shall be the alternate recall floor.

7. Security & Detection Systems

• Requirements for security & detection systems will be determined on a case-by-case basis by the University’s Department of Campus Safety. Consult Client Representative to facilitate this consultation.
8. Computing & Communication Networks

- **Section Under Development - Review w/ ITS**
- All offices, laboratories, meeting rooms, classrooms and printer/photocopier locations shall be provided with computer outlets as designated in the Program of Requirements and as required for VoIP service.
- Design of computing and communications networks shall be carried out in consultation with the University’s Information Technology Services unit.
- Cabling for network installations shall be identified according to the following standard:
  - A = 1 Cat 6 terminated, 1 active network connection.
  - B = 2 Cat 6 terminated, 1 active network connection, 1 future spare.
  - C = 3 Cat 6 terminated, 2 active network connections, 1 future spare.
  - D = 4 Cat 6 terminated, 3 active network connections, 1 future spare.
  - E = Roughed in network outlet.
- All lines that are pulled are to be terminated.
- Refer to Part 6, Section E1020 - Institutional Equipment, for audio-visual system requirements.
D5090  Other Electrical Systems

*New Sections for Consideration:*

1. Grounding Systems
2. Emergency Power Systems
3. Floor Raceway Systems
4. Utility Revenue Meters
E. Equipment & Furnishings

E10 Equipment

E1000 General

- Where specialty equipment not normally within the field of local contractors is to be installed, installation and start-up by factory-trained representatives shall be specified.
- Detailed parts lists for all equipment, with exploded views and part numbers, shall be provided in Contract. This information shall be sufficiently complete to permit the Owner to order any repair component without making further reference to the manufacturer or supplier.

E1010 Commercial Equipment

1. Vending Equipment

- Confirm requirement for and location of vending equipment with the Client Representative and the University’s Consumer Services Division.
- Vending machines are to be integrated with the interior design of the space.
- Locate vending machines such that they are visible, but not obtrusive. To discourage thefts and vandalism, location of the machines should be visually open, and if possible under partial supervision (e.g. within sight from a general office or well used public area.)
- Locate vending machines such that they do not impede traffic flow in public areas such as corridors, vestibules, and stairwells.
- Provide a common, durable, elevated base for the installation of machines to provide visual continuity and facilitate cleaning.
- Provide a waste and recycling point near each vending machine area. Refer to Part 6, Section E1092 - Solid Waste Handling Equipment for specification of waste and recycling containers.
- Any required services should be brought to the machines as discretely as possible.

E1020 Institutional Equipment

1. Multi-Media Equipment

- Provide video display systems and audio systems as indicated in the Program of Requirements. Confirm requirements with Educational Media Access and Production (eMAP) through Client Representative.

2. Where video display or audio equipment is required, confirm specific requirements with the University’s Educational Media Access and Production (eMAP) unit, through the Client Representative.

- Provide lighting controls, either through dimming or switching, that cover a full range of light levels for audio/visual presentations.
- Where projection screens are required, specify as follows:
• Manual Projection Screens: DaLite Model C with CSR (Controlled Screen Return), Video Format, Matte White surface, size to be determined by eMAP. (Delete? Elizabeth Lulchak to confirm.)

• Motorized Projection Screens: DaLite Tensioned Cosmopolitan Electrol with Low Voltage Control, Video Format, Matte White surface, size to be determined by eMAP. (Delete? Elizabeth Lulchak to confirm.)

• Provide power and data connections as directed by University of Saskatchewan Information Technology Services (ITS) and Educational Media Access and Production (eMAP) through Client Representative.

2. Office Equipment

• Office equipment will not normally be provided as part of the Project, unless otherwise instructed, but should be provided for in the design of spaces and building services. These requirements will be listed in the Program of Requirements.

3. Other Specialty Equipment

• Requirements for specialty equipment, such as library, theatre, art, laboratory or medical equipment, will be determined in conjunction with the Client Representative and the building users, on a case-by-case basis.

• Building maintenance equipment, food service equipment, etc... will not normally be provided as part of the Project, unless otherwise instructed, but should be provided for in the design of spaces and building services. These requirements will be listed in the Program of Requirements.
E20 Furnishings

E2010 Fixed Furnishings

1. General Requirements
   • This section describes the requirements for Fixed Millwork, Blinds & Window Coverings,
     Fixed Floor Grilles & Mats, Fixed Multiple Seating and Fixed Interior Landscaping.

E2012 Fixed Millwork

1. Reference Standards
   • Furnishings (materials & installations) shall conform to the most recent edition of the
     following standards, as applicable:
     ▪ ANSI A208.1 - Particleboard.
     ▪ ANSI A208.2 - Medium Density Fibreboard (MDF) for Interior Applications.
     ▪ AWMAC (Architectural Woodwork Manufacturers Association of Canada) -
       Architectural Woodwork Standards.
     ▪ BHMA A156.9 - Cabinet Hardware.
     ▪ CHPVA (Canadian Hardwood Plywood and Veneer Association) - Official Grading
       Rules for Canadian Hardwood Plywood.
     ▪ NEMA (National Electrical Manufacturers Association) LD3-2005 - High-Pressure
       Decorative Laminates.
     ▪ Canada Green Building Council (CaGBC) LEED® Canada-NC Reference Manual.

2. Products & Materials
   • In the design and specification of millwork, the Consultant is directed to maximize the
     use of materials that embody sustainable design principles.
   • Specify materials with a minimum 10% recycled content, in accordance with LEED®
     Canada-NC Materials & Resources Credit 4, unless instructed otherwise.
   • Specify a minimum of 20% building materials and products extracted, processed, and
     manufactured within the region, in accordance with LEED® Canada-NC Materials &
     Resources Credit 5.
   • Consider rapidly renewable building materials and products, as defined by LEED®
     Canada-NC Materials & Resources Credit 6.
   • Specify wood-based materials and products that are certified in accordance with the
     Forest Stewardship Council’s (FSC) Principles and Criteria, in accordance with LEED®
     Canada-NC Materials & Resources Credit 7.
   • Specify wood, agrifibre products and laminating adhesives that contain no added urea-
     formaldehyde resins, in accordance with LEED® Canada-NC Indoor Environmental
     Quality Credit 4.4.
• Specify low-VOC adhesives, sealants, paints & coatings, in accordance with LEED® Canada-NC Indoor Environmental Quality Credit 4.1 & 4.2.

• Hardwood veneer is generally preferred over other materials for cabinet fronts & exposed sides. However, finishes should be selected on a project-by-project basis, based on the application. Consider appearance, durability and ease of housekeeping. Selection of finishes should be made in consultation with the Client Representative.

• Millwork hardware should normally be satin stainless steel finish, unless another finish is required to match other building hardware.

3. Design & Execution

• The Consultant shall design and specify all millwork and finish carpentry to be fabricated in accordance with the most current edition of the Architectural Woodwork Manufacturer’s Association of Canada (AWMAC) Architectural Woodwork Standards.

• AWMAC “Economy Grade” shall be specified for service rooms, mechanical spaces, storage rooms, etc...

• AWMAC “Custom Grade” shall be specified generally, unless directed otherwise.

• AWMAC “Premium Grade” shall be specified for reception counters, boardrooms, and similar high-profile or public areas. Consultants are directed to seek guidance from the Client Representative if in doubt with respect to the appropriate grade of millwork.

• The dimensions provided in the Program of Requirements for shelving, cupboards, and drawers should be taken as the minimum clear or inside measurement unless otherwise stated. For economy, these should all be made to the nearest larger standard module.

• All floor standing built-in units should have toe spaces. All drawers are to be fitted with fallout stops.

• Only where so stated are drawers or cupboards to be locked. Keying systems will be determined by the University, and should be independent of any room door keying system.

• All shelving in cupboards and on walls is to be adjustable unless otherwise stated. In general, shelving should be no lower than 150 mm from the floor. Shelf standards should be spaced at no greater spacing than 450 mm on centre.

• Built in furniture is to be placed so as to not cover or impede access to radiation, pipe chases, electrical devices or plumbing access areas unless adequate access panels are included.

4. Warranty

• All millwork and finish carpentry shall be guaranteed under the Architectural Woodwork Manufacturers Association of Canada (AWMAC) Guarantee and Inspection Service. Consultants are instructed in include the following wording in the specifications:

  “Architectural woodwork shall be manufactured and/or installed to the current AWMAC Architectural Woodwork Standards and shall be subject to an inspection at the plant and/or site by an appointed AWMAC Certified Inspector. Inspection costs shall be included in the tender price for this project. (Contact your local AWMAC Chapter for
details of inspection costs). Shop drawings shall be submitted to the AWMAC Chapter office for review before work commences. Work that does not meet the AWMAC Architectural Woodwork Standards, as specified, shall be replaced, reworked and/or refinished by the architectural woodwork contractor, to the approval of AWMAC, at no additional cost to the Owner.

If the woodwork contractor is an AWMAC Manufacturer member in good standing, a two (2) year AWMAC Guarantee Certificate will be issued. The AWMAC Guarantee shall cover replacing, reworking and/or refinishing any deficient architectural woodwork due to faulty workmanship or defective materials supplied and/or installed by the woodwork contractor, which may appear during a two (2) year period following the date of issuance.

If the woodwork contractor is not an AWMAC Manufacturer member they shall provide the Owner with a two (2) year maintenance bond, in lieu of the AWMAC Guarantee Certificate, to the full value of the architectural woodwork contract.”

- For more information about AWMAC and the GIS Program visit the AWMAC website at www.awmac.com and contact your local AWMAC Chapter office or phone the GIS office at: 1-866-447-7732.
1. Products & Materials
   - Blinds should normally be specified as manual, smooth-operating, chain and sprocket horizontal window roller shades, with the following component specifications:
     - Fabric: Single thickness, non-ravelling, 0.76 mm thick vinyl fabric, woven from 0.46 mm diameter extruded vinyl yarn, 21% polyester and 79% reinforced vinyl. Colour to be approved by University Interior Designer. Degree of Openness: 1% - 5%, to be approved by University Interior Designer.
     - Shade Roller Tube: Extruded aluminum, 50 mm diameter, with reinforced internal ribs to provide maximum span without tube deflection.
     - Exterior Oval Hem Bar: 19 mm tubular extruded aluminum, with recess to secure fabric, without visible seams.
     - Internal Tension Idler: Adjustable, to automatically control the amount of torque generated for constant smooth operation of the shade system, with automatic release during down-travel, and automatic engage during up-travel.
     - Chain Drive: Heavy duty, commercial grade sprocket, a planetary gear assembly for increased performance, speed ratio, smoothness, and balance to the chain and shade assembly.
     - Operating Chain: No.10, heavy duty stainless steel bead chain, 40 kg load test.
     - Chain Hold Down: To fully secure shade to chain holder.
     - Mounting Brackets: heavy-duty, galvanized steel, snap on brackets for ceiling, wall, or recessed mount in ceiling.
     - Closure Box: One piece extruded aluminum box, closed on all four sides, top, back, sides, and bottom return. Wall Thickness: 1.52 mm. Anodized finish, colour to be approved by University Interior Designer.

2. Design & Execution
   - Specify blinds to be installed to manufacturer’s written instructions.
   - Specify maximum variation of gap at window opening perimeter: 6 mm per 2.4 m, plus or minus 3 mm of shade height.
   - Specify maximum offset from level: 3 mm.
   - Specify shade and shade cloth to hang flat without waves, folds, or distortion.

3. Warranty
   - Specify 5 year manufacturer’s warranty.
E2014 Fixed Floor Grilles & Mats

1. Reference Standards
   • Fixed Floor Grilles & Mats (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • ASTM B210M - Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric).
     • ASTM B221M - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
     • NAAMM MBG 531 - Metal Bar Grating Manual.
     • NAAMM MBG 532 - Heavy Duty Metal Bar Grating.

2. Products & Materials
   • Specify floor grilles at main entrances to comply with the most recent edition of NAAMM MBG 531 - Metal Bar Grating Manual.
   • Specify removable aluminum floor grilles in a recessed aluminum frame.
   • No drainage system is required.
E2015  Fixed Multiple Seating

- Requirements for fixed multiple seating will be developed in conjunction with Facilities Management Division on a case-by-case basis.
1. General Requirements
   • Planters may be considered for appropriate public locations. The concept and location of planters in public areas should be considered at the schematic stage of design, and approved by Facilities Management Division.

2. Design & Execution
   • Provide sufficient lighting (150 - 200fc) to ensure plants are viable.
   • If natural lighting levels are inadequate, provide a combination of fluorescent and H.I.D. lighting fixtures.
   • Planters shall be architecturally integrated into the space. Planter design should be such that use of the planter structure as seating or a gathering point will not inadvertently damage the plants.
   • In some instances, planters will be filled with peat moss, and the plants will be left in their pots for ease of replacement. In other instances the planters may be filled with soil and the plants placed directly in the soil. Consult the Facilities Management Division Grounds Manager, through the Client Representative, for direction on this point.
   • Planters shall not be elevated more than five feet above the floor because even in mechanically ventilated spaces elevated locations in a room have proved to be too warm and dry.
   • Provision of plant servicing or storage space is not required.
   • Specify a waterproofing membrane to inside of planter.
   • No drain is required.
E2020 Movable Furnishings

- Moveable furniture will normally be chosen and procured by Facilities Management Division, unless otherwise agreed.

E1092 Solid Waste Handling Equipment

- Interior waste receptacles shall be: Free-standing, 125 litre capacity bin, Bobrick B-2400, stainless steel finish, or approved equivalent.

- Interior recycling containers shall be: ‘Delano’ three stream recycling unit, model # DEL079, manufactured by Ecolad Corporation, tel.: 1-800-665-6263, www.ecolad.com Powder coat finish, Colour Pantone Metallic Silver #877C. Alternate colours may be selected to match building finishes, with the approval of the FMD Interior Designer, though the Client Representative.
F. Special Construction & Demolition

F10 Special Construction

F1030 Special Construction Systems
- Requirements for any special construction systems or structures such as air-supported structures, pre-engineered buildings, radiation containment, vaults, etc... will be developed in conjunction with Facilities Management Division on a case-by-case basis.

F1040 Special Facilities
- Requirements for special facilities such as aquatic facilities, ice rinks, incinerators, animal facilities, liquid & gas storage tanks, etc... will be developed in conjunction with Facilities Management Division on a case-by-case basis.

F1050 Special Controls & Instrumentation
- Requirements for special controls, recording instrumentation, building automation systems, etc... will be developed in conjunction with Facilities Management Division on a case-by-case basis. Refer to Part 2, Section 2.4.5. - Controls Design and Scope of Work.
Selective Building Demolition

Building Elements Demolition

Section Under Development - to be reviewed by Workplace Safety & Environmental Protection.

1. General Requirements
   - This section describes the requirements concerning the demolition of buildings and building elements.

2. Regulatory Requirements
   - Specify that Contractor shall conform to applicable code for demolition of structures, safety of adjacent structures, dust control, runoff control, disposal, work requiring electrical disconnection or re-connection, and work requiring gas disconnection or re-connection.
   - Specify that Contractor obtain required permits from authorities.
   - Ensure that building or site exits are not closed or obstructed.
   - Ensure that roadways and sidewalks are not closed or obstructed without consent from the Client Representative.
   - Shutdowns of gas, electrical, fire or life safety systems are to be carried out by the Facilities Management Division. Service shutdowns shall be arranged by application in writing to the Client Representative at least 10 days in advance. For more information, refer to the University standard Mechanical and Electrical Specifications.
   - If toxic or hazardous materials are discovered by the Consultant, the Consultant shall inform the Client Representative immediately.
   - The responsibilities of the Owner and Contractor with respect to toxic or hazardous materials present at the jobsite are defined under the standard forms of contract employed by the University (CCDC2, CCDC3, etc...), as amended by the University’s standard Supplementary Conditions. Please refer to these documents for this information.

3. Preparation
   - Consultant shall consult with the Client Representative to determine what materials are to be salvaged and returned to Owner. The Contractor shall remove and deliver salvaged materials to a location on the University of Saskatchewan campus selected by the Client Representative.
   - Specify the provision of temporary barriers, security measures, insulated partitions or weatherproof closures where required.
   - Specify that the Contractor shall notify affected utility companies before starting work and comply with their requirements.
   - Specify that the Contractor shall provide appropriate temporary signage including signage for exit or building egress.
• Specify that the Contractor shall arrange to have utilities located and marked prior to starting work.

4. Execution
• Demolition shall be conducted to minimize interference with adjacent and occupied buildings or building areas.
• Where adjacent building areas are occupied during demolition, the Consultant should specify that noisy, malodorous, dusty or otherwise disruptive demolition work shall be conducted after 4:30 pm or on weekends.
• Demolition shall be conducted in an orderly and careful manner.
• Items scheduled to be salvaged or to remain in place shall be protected.
• Existing landscaping materials, structural members, and any other building elements which are not scheduled to be demolished shall be protected.
• Prevent movement or settlement of adjacent structures.
• If adjacent structures appear to be in danger, demolition work shall stop immediately, and the Contractor shall notify the authority having jurisdiction, the Consultant, and the Owner.
• Redundant conduit and utilities shall be removed within the demolition area.
• Redundant foundation walls, footings and slabs shall be removed.
• Demolished materials shall be removed from site except where specifically noted otherwise. No materials shall be burned or buried on site. Site shall be left in a clean condition.
• Refer also to requirements listed under Part 6, Section F2015 - Construction Waste Management, below.
1. General

- This section describes the requirements concerning the disposal of waste and salvage materials resulting from demolition and construction work.
- The University’s standard Contract Documents stipulate that the Contractor shall remove all waste products, debris and surplus or rejected materials from the site when notified to do so by the Consultant. No materials shall be burned on site. No material shall be backfilled or buried on site. These requirements shall be interpreted to include all debris as well as temporary structures.
- The University has established that construction and demolition of buildings generate the least amount of waste possible. This requires that construction processes ensure as little waste as possible, either due to error, poor planning, breakage, mishandling, contamination, or other factors. The University recognizes that waste in any project is inevitable, but requires that as much of the waste materials as economically feasible be reused, salvaged, or recycled.
- Gravel, large boulders and stones from the site should be salvaged and stockpiled at a site designated by the University. The University will also designate a site at which any surplus excavation material free from boulders and foreign material, should be deposited. Any other surplus material is to be removed entirely from University of Saskatchewan property.
- Consultants should ensure that Project specifications permit the re-use of undamaged building materials, where feasible.
- Waste disposal to landfills shall be minimized. Specify that at least 50% (75% preferred) of construction, demolition, land clearing and packaging debris be recycled and/or salvaged. Calculation may be done by weight or volume, but should be consistent throughout Project.

2. Reference Standards


3. Waste Management Plan - Procedures

- Specify that a Waste Management Plan be prepared and implemented by the General Contractor.
- The Waste Management Plan is a Project-specific plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to reduce the amount of material being landfilled.
- The following materials shall be tracked and controlled by the Contractor, by means of the Waste Management Plan:
  - Cardboard.
  - Clean dimensional wood.
  - Beverage containers.
  - Land clearing debris.
- Concrete.
- Brick.
- Concrete Masonry Units (CMU).
- Asphalt.

- Metals from banding, steel stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
  - Gypsum board.
  - Plastic buckets (from packaging).
  - Carpet and carpet pad trim.
  - Paint.
  - Plastic sheeting and packaging.
  - Rigid plastic foam insulation.

- The Waste Management Plan shall be submitted to the Client Representative for approval before the start of construction or demolition. The WMP shall contain the following:
  - Analysis of proposed jobsite waste to be generated, including types and quantities.
  - Landfill Options: Name of landfill where waste will be disposed.
  - Alternatives to Landfill: A list of waste materials from Project that will be separated for reuse, salvage, or recycling, and the proposed local market or destination for each material.
  - Materials Handling Procedures: A description of the means any waste materials identified above will be protected from contamination, and a description of the means to be employed in recycling materials consistent with requirements for acceptance by designated facilities.
  - Transportation: A description of the means of transportation of recyclable materials, whether materials will be site-separated and self-hauled to designated centres, or whether mixed materials will be collected by waste hauler and removed from site, and destination of materials

4. Waste Management Plan - Implementation

- Manager: Specify the designation of an on-site party responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.

- Distribution: Specify that copies of the Waste Management Plan be distributed to the Job Site Foreman, each Subcontractor, the Owner, and the Consultant.

- Instruction: Specify the provision of on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by parties at appropriate stages of Project.

- Separation facilities: Specify a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
- Hazardous wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

- A Summary of Waste Generated by the Project shall be submitted with each Application for Progress Payments. Failure to submit information shall render Application for Payment incomplete and delay Progress Payment. The Summary shall contain the following information:
  - Amount in tonnes or cubic metres (tons or cubic yards) of material land filled from the Project,
  - Identity of the landfill, and total amount of tipping fees paid at the landfill, and total disposal cost. Include manifests, weight tickets, receipt, and invoices.
  - Each material recycled, reused, or salvaged from the Project.
  - Amount in tonnes or cubic metres (tons or cubic yards).
  - Date removed from the job site and name of the receiving party.
1. General Requirements

- *Facilities Management Division* (FMD) is committed to the provision and maintenance of a safe, healthy, secure and environmentally friendly workplace in which to carry on its affairs and activities.

- FMD’s minimum acceptable standard is compliance with the current Occupational Health and Safety Act and Regulations, WHMIS and other related Acts and Regulations, as well as the University of Saskatchewan’s Health Safety and Environmental Protection Policy Statement requirements. To eliminate unnecessary risks, all FMD employees, Contractors and Subcontractors are required to meet and strive to exceed these minimum standards.

- For Projects involving alterations to or demolition of existing buildings, the Client Representative will arrange to have a Hazard Identification and Risk Assessment carried out prior to the start of construction. The hazard assessment forms are to be posted on the work site by the Client Representative, and all workers are required to read them before starting work on the Project. For further information relating to this procedure, please refer to the *Facilities Management Division Safety Manual*, Element 6, “Hazard Identification, Risk Assessment and Control Methods.”

- FMD administers a comprehensive Asbestos Management Program, the mandate of which is to control the hazards of exposure to airborne asbestos fibres by the identification and elimination or containment of asbestos containing materials (ACM). The program includes a complete inventory of all accessible asbestos containing material, on-site labeling, air monitoring, disposal and control methods.

- All modifications to campus buildings will be assessed for asbestos hazards by *Facilities Management Division*, Asbestos Management Coordinator or their authorized designate. Remediation will be conducted by competent *Facilities Management Division* staff or by competent asbestos abatement contractors under contract to the University. All asbestos abatement for each Project will be conducted independently from the contract with the General Contractor. The Client Representative is responsible for the coordination of the work of the Asbestos Abatement Contractor with the work of the General Contractor and his Subcontractors.

- The responsibilities of the Owner and Contractor with respect to toxic or hazardous materials present at the jobsite are defined under the standard forms of contract employed by the University (CCDC2, CCDC3, etc...), as amended by the University’s standard Supplementary Conditions. Please refer to these documents for this information.

2. Reference Standards

- Hazardous Components Abatement procedures shall conform to the most recent edition of the following standards, as applicable:
  - Saskatchewan Occupational Health and Safety Regulations.
  - University of Saskatchewan Health Safety and Environmental Protection Policy Statement.
3. Products & Materials

Hazardous materials present in University buildings may include (but are not limited to):

- Asbestos and asbestos containing materials (ACM’s)
- Biohazard materials and contamination
- Fire suppression agents
- Fume hood contaminants
- Hydraulic fluids, oils, etc...
- Laboratory chemicals
- Lead-based paints & coatings
- Mercury
- PCB’s
- Radioactive materials or contamination
- Refrigerants
G. Sitework

G20 Site Improvements (Review w/ Darren Crilly)

G2000 General

1. General Requirements
   - All sites are to be designed to promote personal safety. Avoid designing areas of potential entrapment. Encourage casual surveillance.
   - All sites are to be designed to be accessible and safely usable by persons with physical, sensory and cognitive disabilities.
   - Site and landscape design should implement sustainable design strategies wherever possible. Siting and landscaping should be designed in relation to solar orientation, seasonal weather conditions and microclimate.
   - Site design should encourage pedestrian and bicycle access.
   - In the Core Campus South, Core Campus North, River Valley, McEown Park and Health Sciences Precincts, pedestrians should take precedence over vehicles, except where access by emergency vehicles is required. Major pedestrian ways should be separated from vehicular routes as much as possible and connected only where required. The separation of these two functions may be achieved by major structures, landscaping, minor structures such as hills, water, fences, etc., and by grade separation. Details of traffic patterns expected in the region of the site may be obtained from the University.
   - Due to the size of the University of Saskatchewan campus and the extent of its hard and soft landscaped areas, economy of maintenance is a primary consideration.
   - Sites, landscapes & irrigation systems shall be designed in accordance with the most recent version of LEED® Canada-NC Water Efficiency Credit 1.1 (reduce potable water consumption for irrigation by 50% over conventional means).
G2010 Roadways

Section Under Development - Review with Darryl Cherry

1. Reference Standards
   • Roadways (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • City of Saskatoon standard drawings for Curbs & Walks, Gravel Lanes, Medians, Streets, Catch Basins, Manholes, Parking, Trenching, Berms, Crosswalks.
     • City of Saskatoon standard specifications for Earthworks, Aggregate, Asphalitic Materials, Metals, Concrete, Pavement Markings.

2. Products & Materials
   • As per City of Saskatoon standards.

3. Design & Execution
   • In general, roads should be designed for two-way traffic at 40KPH, with allowance for emergency parking.
   • Road design and placement should consider:
     ▪ Space for pedestrian walks (existing, new and probable future)
     ▪ Bicycle traffic
     ▪ Transit traffic and access
     ▪ Driver and pedestrian safety
     ▪ Location of utilities
     ▪ Space for snow accumulation.
     ▪ Traffic noise, vibration and their effect on building occupants and sensitive equipment.
     ▪ Effects on existing topography and existing mature landscaping.
   • Utility lines and roads should be parallel to each other where possible.
   • Indented curb loading zones, if provided, should be 3000mm wide.
   • Minor roads should service the buildings in a direct and obvious manner for both visitors and service vehicles. Service entrances should be placed to avoid the impression of a ‘back door’.
   • Location of buildings and pedestrian routes should take precedence over road location.
1. **General Requirements**
   - Parking provision should take into account the planning principles contained in the *Core Area Master Plan*. Consultants are directed to refer to this document for further guidance. A Board of Governors’ 1986 Resolution permits no further loss of landscaped areas in order to achieve more parking; thus any additional parking can only be provided using alternative solutions such as increasing existing densities or by trade-offs where any loss of green space is substituted for equivalent green space increase in another area.

2. **Reference Standards**
   - Refer to Part 6, Section G2010 - Roadways.

3. **Products & Material**
   - *Facilities Management Division* will determine, on a case-by-case basis, whether a parking lot should be specified with a paved or a gravel surface.

4. **Design & Execution**
   - Major Parking lots are generally located near the perimeter of the Campus. Minor lots are generally associated with each building requiring short-term parking and service vehicles.
   - Major roads should lead to major parking lots; minor roads to minor parking lots. Where possible access to parking areas should be provided to eliminate or reduce the need to access Campus Drive with private vehicles.
   - Where parking lots are located adjacent to buildings, provide clear sight lines from such parking lots to a primary building entrance.
   - Consideration should be given to the provision of bio-swales, water-absorptive paving, and other means of reducing storm-water runoff from parking lots.

5. **Accessibility Requirements**
   - Refer to CAN/CSA B651 *Accessible Design for the Built Environment* for additional requirements.
   - Barrier-free vehicular parking should be provided with every new or substantially renovated development.
   - Provide a minimum number of barrier-free car parking spaces in each parking lot as follows:

<table>
<thead>
<tr>
<th>Total Parking Spaces Provided</th>
<th>Minimum Barrier-Free Car Spaces Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>1</td>
</tr>
</tbody>
</table>

□ 304
Provide a minimum number of barrier-free van parking spaces in each parking lot as follows:

<table>
<thead>
<tr>
<th>Total Parking Spaces Provided</th>
<th>Minimum Barrier-Free Van Spaces Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-49</td>
<td>1</td>
</tr>
<tr>
<td>50-299</td>
<td>2</td>
</tr>
<tr>
<td>300-699</td>
<td>3</td>
</tr>
<tr>
<td>700 &amp; Over</td>
<td>4</td>
</tr>
</tbody>
</table>

• Barrier-free car and van parking spaces shall be designed to meet CAN/CSA B651.
• Barrier-free car & van parking spaces shall be located as close as possible to the main accessible entrance of the building. Provide a barrier-free path of travel between barrier-free parking spaces and the main accessible building entrance. Do not cross any drive aisles.
• Provide curb ramp access to barrier-free parking spaces, to City of Saskatoon standard design and specifications. Locate curb ramps such that they will not be blocked by parked cars.
• Barrier-free parking spaces shall be paved and level (slope no greater than 2%).
• Provide a barrier-free exterior passenger loading zone at or near each main building entrance, designed to CAN/CSA B651 requirements.
G2030 Pedestrian Paving

Section Under Development - Review with Darryl Cherry

1. Reference Standards
   • Pedestrian Paving (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     • City of Saskatoon standard drawings for Curbs & Walks.
     • City of Saskatoon standard specifications for Earthworks, Aggregate, Asphaltic Materials, Metals, Concrete, Pavement Markings.

2. Products & Materials
   • Acceptable pedestrian paving materials include:
     ▪ Asphalt.
     ▪ Broom finish concrete.
     ▪ Light sand-blasted concrete.
     ▪ Precast concrete unit pavers.
     ▪ Well-compacted crushed stone may be used in some applications with the approval of FMD.
   • All pedestrian walks shall be designed with poured concrete curbs.
   • Do not specify ceramic tiles in outdoor locations.

3. Design & Execution
   • Standard width for paved walks intended for general use: 2550mm.
   • Minimum width for paved walks intended for general use: 1500mm. (Required to accommodate snow clearing equipment.)
   • Longitudinal slopes should be no more than 5% with maximum 2% cross-fall.
   • Specify tooled transverse contraction joints in concrete walks, at intervals of 2000mm.
   • Specify lateral expansion joints in concrete walks at intervals of 6000mm.
   • Place isolation joints around manhole rings, catch basins, and adjacent to concrete curbs, catch basins, buildings, or permanent abutting surfaces.
   • Where possible, grade changes should be accommodated with ramps rather than steps. Where steps are included, ramping systems should also be provided as an alternate route.
   • Curb cuts, ramps and handrails should be provided where appropriate and feasible to ensure universal accessibility.
   • Pedestrian walks should be located away from roadways to avoid roadway snow plough debris and splashing by motorists.
   • Pedestrian walks should be designed to consider desire lines and short-cutting.
• Pedestrian walks shall be designed to also accommodate fire and other emergency vehicles, snow plows and other service vehicles as necessary.

4. Accessibility Requirements
• Refer to CAN/CSA B651 - Accessible Design for the Built Environment for additional requirements.
• Provide an accessible route from streets and parking areas to all accessible building entrances.
• Barrier-free walkways shall be a minimum 1500mm wide.
• Exterior ramps shall be a minimum clear width of 1800 mm. (Note that this minimum width is in excess of the minimum building code and CAN/CSA B651 requirements in order to accommodate snow clearing equipment.)
G2040 Site Development

Section Under Development

G2044 Signage

- Building name signs will normally be included as part of the scope of a major Project. Building name signs will be specified as free-standing units to a standard design by Facilities Management Division. CAD drawings of the signage standard will be made available upon request. Refer to Appendix XXX.

- The University will supply and install traffic and directional signage.

G2045 Site Furnishings

1. General

- This section describes the University's standards and guidelines with respect to exterior furnishings.

- As part of the scope of each major Project, the Consultant shall include an appropriate number of benches, bike racks, cigarette butt receptacles, recycling containers and waste receptacles.

- Picnic table locations shall be approved by Facilities Management Division.

2. Products & Materials

- Bench Type 1: (For locations near collegiate gothic buildings) ‘Plainwell’ bench by Landscapeforms, tel.: 604-739-9939.
  - http://wwwlandscapeformscom/en-US/Products/Pages/PlainwellBench.aspx
  - 72” or 96” length.
  - With or without center/intermediate arms.
  - Seat & back material: unfinished Ipe wood, FSC Certified or ‘Bark’ colour Polysite composite. (Selection to be approved by FMD).
  - Powdercoat color for arms and supports: ‘Stormcloud’.

- Bench Type 2: (For locations near modernist or contemporary buildings) ‘Gretchen’ bench by Landscapeforms, tel.: 604-739-9939.
  - 72in. or 96in. length.
  - Backed only.
  - Where arms are required, specify ‘loop’ style. (Not ‘ornamental’ arms).
  - Seat & back material: unfinished Ipe wood, FSC Certified.
  - Wall mount or freestanding/surface mount.
  - Powdercoat color for arms and supports: ‘Stormcloud’.

- Bike Rack Type 1: Model BRCS series: Cycle Sentry™ Bike Rack, manufactured by Victor Stanley and available at Shanahan’s, or approved equal.
  - http://wwwsecuresitedesigncom/products/?mode=prodDetail&id=22&catId=0
• Specify 5, 7, 9, 11, or 13 bike capacity.
• Specify bolted surface plate.
• Specify polyester powder coat, colour RAL 7022 ‘Umbra Grey’.

Bike Rack Type 2: Model MBR200 - SG series Bicycle Rack, manufactured by Maglin Site Furniture Inc., Calgary, or approved equal.

• Specify bolted surface plate.
• Specify polyester powder coat, colour RAL 7022 ‘Umbra Grey’.

Cigarette Butt Receptacles: ‘Grenadier’ ash urn by Landscapeforms, tel.: 604-739-9939.
• Surface mounted.
• Powdercoat color: ‘Stormcloud’.

Picnic Table: ‘Gretchen’ picnic table by Landscapeforms, tel.: 604-739-9939.
• Seat & top material: unfinished Ipe wood or ‘Bark’ colour Polysite composite.
• If wood is selected; specify FSC Certified.
• Freestanding or surface mount
• Powdercoat color: ‘Stormcloud’.

• Note: for specification of interior waste and recycling containers, refer to Part 6, Section E1092 - Solid Waste Handling Equipment.

3. Design & Execution
• Specify waste receptacles and recycling containers outside all building entrances.
• Cigarette butt receptacles are required outside all building entrances, at a minimum distance of 10 meters back from doorways and air intakes.
• Adequate bicycle parking (bike racks) should be provided especially near major building entrances.

4. Warranty
• Specify a minimum 3 year manufacturer’s warranty.
G2050 Landscaping

Section Under Development - Review with Darren Crilly

1. General Requirements
   - Landscape design will normally be carried out by a Landscape Architect subcontracted to the Consultant. Other contractual arrangements may be made in particular circumstances at the discretion of Facilities Management Division.
   - Hard landscape construction will normally form part of the construction Contract.
   - Soft landscape construction (finish grading, planting, seeding & fertilizing) may be carried out by Facilities Management Division or may form part of the construction Contract, depending on the workload of the FMD Grounds department and on the size and complexity of the job. Consultants should request a decision on this matter from the Client Representative before the preparation of the Contract Documents.
   - Landscape designs shall be reviewed for approval by the Facilities Management Division Grounds Department.
   - The history of landscape design at the University of Saskatchewan has seen the original campus plan of 1907, with its formal landscaping and plantings, give way to an approach that is more informal in character. The campus contains older areas, such as the Bowl and some of the smaller original quadrangles, that are more formally arranged and planted. Newer areas, such as the Core Campus North Precinct, north of Campus Drive, are informally planned with more naturalistic landscaping. New landscape designs should not be limited to one approach or the other, but should be carried out in a way that is aware and considerate of the historical and physical context.
   - Any tree with a trunk diameter of 200mm or greater that is removed as part of a construction project shall, as part of the project, be replaced by a new tree. Replacement tree species shall be approved by Facilities Management Division Grounds Department.
   - Landscape construction and plantings should be coordinated with Facilities Management Division Grounds Department.
   - An excavation permit shall be obtained from FMD, through the Client Representative, prior to any digging.

2. Reference Standards
   - Landscaping (materials & installations) shall conform to the most recent edition of the following standards, as applicable:
     - ANSI Z60.1 - Nursery Stock.
     - NAA (National Arborist Association) - Pruning Standards for Shade Trees.
     - Saskatchewan Dutch Elm Disease Regulations.

3. Products & Materials
• Selection of plant species shall be on the recommendation of the Landscape Architect, subject to approval by Facilities Management Division Grounds Department.

• In selecting plant species, the following should be taken into account:
  ▪ Consideration of existing theme plantings: The Core Campus South precinct (particularly the Bowl area) contains a preponderance of American Elm specimens. Additional plantings of American Elm may be considered, but due to the possibility of Dutch Elm Disease, it is recommended that other species also be considered. Large scale theme plantings of Scots Pine and Poplar have been carried out in other areas of the campus. Medium scale theme plantings of large shrubs and small trees with sufficient repetition of species may be used.
  ▪ Repetition from one site to another of given species of plant materials.
  ▪ Soil conditions, sunlight & shade, microclimate & seasonal weather conditions.
  ▪ Salt spray and snow banks adjacent to roads.
  ▪ Hardiness: Native and drought-resistant materials should be used in preference to less hardy plants wherever practicable. Hardy plants developed in prairie nurseries and experimental stations are to be used in preference to imported varieties. The use of pesticides and herbicides should be discouraged by the selection of hardy species.
  ▪ Drought Resistance: Minimize irrigation & watering requirements by the selection of drought-resistant plants, placement of plants and the use of mulches. Native grass species that do not require mowing or irrigation may be considered depending on the location.
  ▪ Ease and cost of procuring, developing and maintaining materials. Consideration of maintenance costs dictate the need to minimize the use of pruned plantings, flower beds, perennials and other forms of soft landscaping requiring much upkeep and weed removal. ‘Clean’ varieties should be used adjacent to building entrances, walkways, and parking stalls.
  ▪ Lower cost, easily removed and quick growing small materials may be planted over utilities and other underground features. That is, the existence of such features need not circumscribe the landscape design.
  ▪ Allergy potential is an important consideration with plant selection.

4. Design & Execution

• Sites, landscapes & irrigation systems shall be designed in accordance with the most recent version of LEED® Canada-NC Water Efficiency Credit 1.1 (reduce potable water consumption for irrigation by 50% over conventional means).

• Landscape design and architecture should be mutually supportive, and should therefore be developed in close collaboration with each other. For example, deciduous trees may be considered as part of the solar control strategy of a building. Plantings may be used to screen unsightly features such as loading docks, control snow drifting, provide wind protection, reduce solar heat reflection and glare, control traffic patterns, and provide shaded sitting areas.

• Landscape materials shall be salvaged for re-use wherever possible. The University will designate a space to store such materials at the request of the Consultant. Excess topsoil will be salvaged and stockpiled by the University.
• Landscape designs shall be designed for ease of maintenance. Take irrigation, mowing, trimming, pruning, snow clearing, snow storage, icing and other maintenance issues into consideration.

• The design of grassed areas shall take irrigation and mowing into consideration. Provide adequate clearance between and around buildings, trees, landscape furniture etc... for mowing equipment.

• Do not plant trees closer that 2000mm from the face of a building (3000mm preferred). This is to allow room for growth and to provide space around the building for maintenance.

• Special attention should be paid to the visual aspect of the landscape in winter.

• The University’s existing mature trees should be retained and protected wherever possible.

• Specific protection measures shall be designed and incorporated into the Contract Documents where construction may impact existing plantings. Maintain existing grades around existing trees where they are to be retained.

• Grading work should be closely controlled - the term "sub-grading" rather than the more common "rough grading" is more indicative of the standard desired. The difference between sub and finish grades should not be less than 100 mm.

• Grading should provide a positive slope away from all building walls, walks and roads.

• Finish grade should be 50 mm below that of any adjacent walks and should slope down another 50 mm within a 1500 mm distance away from the walk. This is to allow for sod growth, to provide some protection from the blades of snow removal equipment, and to allow for drainage of the walk. Berm development should also be guided by this requirement in most situations. Area grading should be developed to prevent long-term ponding in grassed areas, unless desired as part of a storm-water management strategy. Landscaped areas may drain over curbs into roadways, but should not drain onto or across walks except for small areas.

• Underground sprinkler systems: the installation of these systems will normally be arranged by Facilities Management Division Grounds Department, and will not be included in the construction Contract, unless otherwise instructed. Where specified, irrigation systems shall be high-efficiency.

• Hose bibs: hose bibs are not normally required for landscape watering, unless otherwise instructed.

• Storm water-management should be carried out using landscape measures wherever possible, to minimize the impact of runoff on storm drain systems.

• For all hard landscaped areas, consider measures to reduce the ‘heat island’ effect, such as the use of light-coloured (high albedo) materials, the provision of shade, the use of open-grid paving materials, etc...

• The Consultant shall work with Facilities Management Division to determine what trees and plants on site and on adjacent areas shall be retained and protected. Protected plantings shall be indicated on the Site Plan.

• During Construction, all protected plantings shall be wrapped in burlap and encased with protective wood framework from grade level to height of 2 metres.

• During Construction, roots of designated trees shall be protected to drip-line during excavation and site grading to prevent disturbance or damage. Unnecessary traffic, dumping and storage of materials over root zones shall be avoided.
• Stripping of topsoil and vegetation during construction shall be minimized.

5. Warranty

Ⅲ Where soft landscaping is carried out under the building Contract, specify a warranty covering all plant materials for two (2) continuous growing seasons from date of Substantial Performance of the Work. Dead or unhealthy plants to be replaced with plants of the same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

Ⅲ Specify a maintenance agreement to maintain plant life immediately after placement and until termination of warranty period. Maintenance to include:

• Cultivation and weeding plant beds and tree pits.
• Applying herbicides for weed control in accordance with manufacturer’s written instructions. Remedy damage resulting from use of herbicides.
• Remedy damage from use of insecticides.
• Irrigating sufficient to saturate root system.
• Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
• Disease control.
• Maintaining wrapping, guys, and stakes. Keep guy wires tight. Repair or replace accessories when required.
• Replacement of mulch.
G30 Site Mechanical Utilities

G3010 Water Supply
- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.
- Minimum depth below finished grade: 2750

G3020 Sanitary Sewer
- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.
- The locations and design of sanitary sewer tie-ins will be determined by the Consultant in conjunction with Facilities Management Division’s Mechanical Engineer.
- New building sanitary sewer lines should tie in to existing sewer lines using manholes. Direct tie-ins without manholes are not acceptable.
- Minimum depth below finished grade: 2150

G3030 Storm Sewer
- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.
- The locations and design of storm sewer tie-ins will be determined by the Consultant in conjunction with Facilities Management Division’s Mechanical Engineer.
- New building storm sewer lines should tie in to existing sewer lines using manholes. Direct tie-ins without manholes are not acceptable.
- Minimum depth below finished grade: 2150 for main conduit, feeder lines as required by slope.
- Submersible or extended shaft sump pumps should not be employed. Locate entire pump assembly at floor level with a suction line into a pit. Where loss of prime may be a problem due to long suction lift, specify a storage suction leg. A detail for the recommended configuration of this system is available from FMD.

G3040 Heating Distribution (Steam)
- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.
- Minimum depth below finished grade: 1200

G3050 Cooling Distribution (Chilled Water)
- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.
- Minimum depth below finished grade: 2750
G3080 Underground Gas Distribution

- Refer to University of Saskatchewan standard Mechanical Specifications, available upon request from Facilities Management Division.

- Minimum depth below finished grade: Meet minimum code requirements.
G40 Site Electrical Utilities

Section Under Development

G4010 Electrical Distribution

• Minimum depth below finished grade: Check w/ Karen Leedahl

G4020 Site Lighting

• Integrated building entrance lighting shall be provided. Refer also to Section XXX. All exterior lighting at entrances should be photocell controlled. Lighting of the exterior of buildings, except at entrances, is generally not permitted. Confirm.

• Exterior lighting shall be designed to minimize light pollution.

• The immediate site will require post-top lighting along walks. The post-top units should match the current University Standard, details of which will be made available upon request.

• The design of sidewalk and roadway lighting and associated underground feeders will be provided with University standard detail drawings, however, the Consultant should coordinate the placement of these units to fit into the overall site development. (Check this w/ Karen - is the construction normally in Contract?)

• Provision should be made to feed power to site lighting from the nearest building or parking lot. Control of the units will be through a contactor, the coil of which in turn will be controlled by a photocell.
Appendix A - University Drafting Standards

Section Under Development

1 General Drafting Standards

2 Additional Electrical Drafting Standards

The first drawing shall have a legend showing all devices used on the drawings. The legend should be in the upper right hand corner when possible.

Schematics and riser diagrams should be on separate sheets from the floor plan layouts, with ample spacing between components to allow for Contractor mark-ups and future additions by the University. Schematics and riser diagrams shall show all components of the system with reference to their identification and building location (room number).

Schematic and riser diagrams should be provided for all electrical systems. Diagrams should be laid out with some grouping of components according to their floor levels and areas on those levels, however there is no need to attempt to make the diagrams look like a reconstruction of the building as this takes away from the clarity intended by the diagram. Single line diagrams for power distribution should be oriented from the top to the bottom of the drawing regardless of the floor locations of the panels and the main electrical room.

Panel schedules should note the identification, main breaker size, panel size, number of breakers, bus size, etc.

Motor schedules should note the motor identification, name, size, full load current, overcurrent protection, feeder size, etc.