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BW VISTA RAILINGS-8th EDITION-2015
1.0 INTRODUCTION

Permanent guardrail systems are required near or at the open sides of elevated walking/viewing surfaces for the purpose of minimizing the potential of an accidental fall to a lower level.

Aluminum guardrail assemblies are commonly comprised of straight sections of top rail elevated and supported above a floor by uniformly spaced posts. The posts are anchored to the floor system by means of anchor screws or bolts. A bottom channel runs between support posts just above the floor system. The vertical space between the posts, the bottom channel and top rail is infilled with either glass panels or aluminum pickets. Figure 1 below illustrates the main elements of a glass panel and aluminum picket guardrail system.

![Figure 1: Main Elements of Guardrail Systems](image)

2.0 GENERAL DESIGN

This manual has been compiled to provide relevant structural information which will enable designers, installers, architects, and engineers to select safe and code-conforming guardrail designs using BW Vista products.

The major considerations for the structural design of guardrails are:

1. Structural design criteria as established by governing building codes, bodies and authorities or by specific and unique established project design requirements,
2. Mechanical properties of material used in the manufacture of guardrail elements,
3. Physical properties of guardrail elements,
4. Load capacities of guardrail elements and component systems,
5. Load distribution characteristics of various guardrail elements and systems, and
6. Proper anchorage of support elements to surrounding supporting structures.
2.1 DESIGN CRITERIA

2.1.1 Loadings

Structural design loading requirements for guardrails are specified by governing building codes and bodies, local ordinances, project specifications and/or regulatory authorities. Usually a uniformly distributed load and/or a concentrated load applied to the top rail is specified. The loading requirements of the 2015 International Building Code for guardrails are provided in section 1607.8.1 Handrails and guards as shown below:

1607.8.1 Handrails and guards. Handrail assemblies and guards shall be designed to resist a load of 50 plf (0.73 kN/m) applied in any direction at the top and to transfer this load through the supports to the structure.

Exceptions:

1. For one- and two-family dwellings, only the single, concentrated load required by Section 1607.8.1.1 shall be applied.

2. In Group I-3, F,H and S occupancies, for areas that are not accessible to the general public and that have an occupant load no greater than 50, the minimum load shall be 20 pounds per foot (0.29 kN/m).

1607.8.1.1 Concentrated load. Handrail assemblies and guards shall be able to resist a single concentrated load of 200 pounds (0.89 kN), applied in any direction at any point along the top, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building. This load need not be assumed to act concurrently with the loads specified in the preceding paragraph.

1607.8.1.2 Intermediate Rails. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds (0.22 kN) on a area equal to 1 square foot (0.093m²), including openings and space between rails. Reactions due to this loading are not required to be superimposed with those of Section 1607.8.1 or 1607.8.1.1.

2.1.2 Factors Of Safety

Factors of safety are generally related to a mode of failure. Ductile failure, such as stable (no buckling) yielding of a metal element, is usually assigned a lower factor of safety than is brittle failure, such as screw fracture or anchor bolt pullout. A higher or lower factor of safety may be appropriate depending upon the type of application and other considerations made by the certifying professional. For instance, a higher factor of safety may be more appropriate for glass infill panels since their failure is of a brittle nature. The guardrail configurations/design tables provided at the end of this manual have been developed using the factors of safety as set out in the 2015 International Building Code, AA ASM 35, and Parts 1-A and 1-B of the Aluminum Design Manual.
2.2 MATERIALS AND PROPERTIES

2.2.1 Mechanical Properties Of Aluminum Alloys And Elements

Mechanical properties of aluminum alloys used in BW Vista Guardrail Systems are provided in AA ASM 35 and Parts 1-A and 1-B of the Aluminum Design Manual and are listed in Table 1 below. Properties vary with the composition and temper of the material and also, to some degree, with the profile and the direction of stress.

**TABLE 1: MECHANICAL PROPERTIES OF ALUMINUM ALLOYS AND PRODUCTS**

<table>
<thead>
<tr>
<th>Alloy &amp; products</th>
<th>NOT WELDED</th>
<th></th>
<th></th>
<th>WELDED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fu (ksi)</td>
<td>Fy (ksi)</td>
<td>Fy (ksi)</td>
<td>Fwu (ksi)</td>
<td>Fwy (ksi)</td>
</tr>
<tr>
<td></td>
<td>Elastic modulus (ksi)</td>
<td></td>
<td></td>
<td>(ksi)</td>
<td></td>
</tr>
<tr>
<td>6063-T5 Extrusions up to 0.500</td>
<td>22 ksi (151.7 MPa)</td>
<td>16 ksi (110.3 MPa)</td>
<td>16 ksi (110.3 MPa)</td>
<td>17 ksi (117.2 MPa)</td>
<td>11 ksi (75.8 MPa)</td>
</tr>
<tr>
<td>6063-T6 Extrusions</td>
<td>30 ksi (206.9 MPa)</td>
<td>25 ksi (172.4 MPa)</td>
<td>25 ksi (172.4 MPa)</td>
<td>17 ksi (117.2 MPa)</td>
<td>11 ksi (75.8 MPa)</td>
</tr>
<tr>
<td>6061-T6 Extrusions</td>
<td>38 ksi (262.0 MPa)</td>
<td>35 ksi (241.3 MPa)</td>
<td>35 ksi (241.3 MPa)</td>
<td>24 ksi (165.5 MPa)</td>
<td>20 ksi (137.9 MPa)</td>
</tr>
<tr>
<td>6005A-T61 Extrusions</td>
<td>38 ksi (262.0 MPa)</td>
<td>35 ksi (241.3 MPa)</td>
<td>35 ksi (241.3 MPa)</td>
<td>24 ksi (165.5 MPa)</td>
<td>20 ksi (137.9 MPa)</td>
</tr>
</tbody>
</table>

2.2.2 Physical Properties Of Guardrail Elements

Physical properties of sections of commonly used elements in BW Vista Guardrail Systems are given in Table 2. Typical cross-sections of these elements are provided in Figure 2. Additional elements are shown in BW Vista’s Dealer Catalogue.
TABLE 2: PHYSICAL PROPERTIES OF COMMON ELEMENTS

<table>
<thead>
<tr>
<th>ELEMENTS</th>
<th>ALLOY</th>
<th>AREA</th>
<th>Ixx</th>
<th>Sxx</th>
<th>Iyy</th>
<th>Syy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>in²</td>
<td>in⁴</td>
<td>in⁴</td>
<td>in⁴</td>
<td>10⁶in⁴</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(mm²)</td>
<td>(10⁶mm⁴)</td>
<td>(10⁶mm⁴)</td>
<td>(10⁶mm⁴)</td>
<td>(10⁶mm⁴)</td>
</tr>
<tr>
<td>TOP RAILS</td>
<td>57.2 mm (2 1/4&quot;)</td>
<td>6063-T5</td>
<td>.727</td>
<td>.237</td>
<td>.228</td>
<td>.412</td>
</tr>
<tr>
<td>round top rail for glass panel infill</td>
<td>(469)</td>
<td>(.099)</td>
<td>(3.742)</td>
<td>(.171)</td>
<td></td>
<td>(.5.861)</td>
</tr>
<tr>
<td>57.2 mm (2 1/4&quot;)</td>
<td>6063-T5</td>
<td>.785</td>
<td>.298</td>
<td>.292</td>
<td>.523</td>
<td>.454</td>
</tr>
<tr>
<td>square top rail for glass panel infill</td>
<td>(507)</td>
<td>(.124)</td>
<td>(4.783)</td>
<td>(.218)</td>
<td></td>
<td>(7.440)</td>
</tr>
<tr>
<td>57.2 mm (2 1/4&quot;)</td>
<td>6063-T5</td>
<td>.621</td>
<td>.238</td>
<td>.262</td>
<td>.397</td>
<td>.345</td>
</tr>
<tr>
<td>round top rail for picket infill</td>
<td>(401)</td>
<td>(.099)</td>
<td>(3.705)</td>
<td>(.165)</td>
<td></td>
<td>(5.654)</td>
</tr>
<tr>
<td>57.2 mm (2 1/4&quot;)</td>
<td>6063-T5</td>
<td>.661</td>
<td>.298</td>
<td>.289</td>
<td>.507</td>
<td>.441</td>
</tr>
<tr>
<td>square top rail for picket infill</td>
<td>(426)</td>
<td>(.124)</td>
<td>(4.730)</td>
<td>(.211)</td>
<td></td>
<td>(7.221)</td>
</tr>
<tr>
<td>TOP RAIL SLEEVES/CORNERS</td>
<td>inside round top rail sleeve/corner</td>
<td>6063-T5</td>
<td>.484</td>
<td>.121</td>
<td>.155</td>
<td>.287</td>
</tr>
<tr>
<td>(312)</td>
<td>(.050)</td>
<td>(2.540)</td>
<td>(.119)</td>
<td></td>
<td>(4.503)</td>
<td></td>
</tr>
<tr>
<td>outside round top rail sleeve/corner</td>
<td>6063-T5</td>
<td>.541</td>
<td>.334</td>
<td>.281</td>
<td>.395</td>
<td>.318</td>
</tr>
<tr>
<td>(349)</td>
<td>(.139)</td>
<td>(4.603)</td>
<td>(.164)</td>
<td></td>
<td>(5.202)</td>
<td></td>
</tr>
<tr>
<td>outside square top rail sleeve/corner</td>
<td>6063-T5</td>
<td>.598</td>
<td>.407</td>
<td>.360</td>
<td>.538</td>
<td>.427</td>
</tr>
<tr>
<td>(385)</td>
<td>(.169)</td>
<td>(5.695)</td>
<td>(.224)</td>
<td></td>
<td>(6.995)</td>
<td></td>
</tr>
<tr>
<td>BOTTOM RAILS</td>
<td>bottom rail for glass panel system</td>
<td>6063-T6</td>
<td>.310</td>
<td>.051</td>
<td>.065</td>
<td>.097</td>
</tr>
<tr>
<td>(200)</td>
<td>(.021)</td>
<td>(1.057)</td>
<td>(.040)</td>
<td></td>
<td>(2.357)</td>
<td></td>
</tr>
<tr>
<td>bottom rail for picket panel system</td>
<td>6005A-T61</td>
<td>.208</td>
<td>.007</td>
<td>.015</td>
<td>.052</td>
<td>.077</td>
</tr>
<tr>
<td>(134)</td>
<td>(.003)</td>
<td>(.242)</td>
<td>(.022)</td>
<td></td>
<td>(1.254)</td>
<td></td>
</tr>
<tr>
<td>POSTS</td>
<td>63.5 mm (2 1/2&quot;)</td>
<td>6005A-T61</td>
<td>.780</td>
<td>.772</td>
<td>.617</td>
<td>.772</td>
</tr>
<tr>
<td>square post</td>
<td>(503)</td>
<td>(.321)</td>
<td>(10.115)</td>
<td>(.321)</td>
<td></td>
<td>(10.115)</td>
</tr>
<tr>
<td>50.8 mm (2&quot;)</td>
<td>6005A-T61</td>
<td>.636</td>
<td>.393</td>
<td>.393</td>
<td>.393</td>
<td>.393</td>
</tr>
<tr>
<td>square post</td>
<td>(411)</td>
<td>(.163)</td>
<td>(6.434)</td>
<td>(.163)</td>
<td></td>
<td>(6.434)</td>
</tr>
<tr>
<td>38.1 mm (1 1/2&quot;)</td>
<td>6005A-T61</td>
<td>.460</td>
<td>.156</td>
<td>.208</td>
<td>.156</td>
<td>.208</td>
</tr>
<tr>
<td>square post</td>
<td>(297)</td>
<td>(.065)</td>
<td>(3.404)</td>
<td>(.065)</td>
<td></td>
<td>(3.404)</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td>1 1/4&quot; (31.8 mm)</td>
<td>6061-T6</td>
<td>.667</td>
<td>.194</td>
<td>.234</td>
<td>.194</td>
</tr>
<tr>
<td>schedule 40</td>
<td>(430)</td>
<td>(.081)</td>
<td>(3.837)</td>
<td>(.081)</td>
<td></td>
<td>(3.837)</td>
</tr>
<tr>
<td>handrail pipe</td>
<td>6063-T5</td>
<td>.113</td>
<td>.006</td>
<td>.020</td>
<td>.006</td>
<td>.020</td>
</tr>
<tr>
<td>pickets</td>
<td>(73)</td>
<td>(.003)</td>
<td>(.329)</td>
<td>(.003)</td>
<td></td>
<td>(.329)</td>
</tr>
<tr>
<td>various plates</td>
<td>6061-T5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend
I - moment of inertia
S - section modulus

BW VISTA RAILINGS-8th EDITION-2015
TOP RAILS

- 2 1/4" (57.2 mm) round top rail for glass panel system
- 2 1/4" (57.2 mm) round top rail for picket infill system
- 2 1/4" (57.2 mm) square top rail for glass panel system
- 2 1/4" (57.2 mm) square top rail for picket infill system

TOP RAIL SLEEVES/CORNERS

- Inside round top rail sleeve/corner
- Outside round top rail sleeve/corner
- Inside square top rail sleeve/corner
- Outside square top rail sleeve/corner

BOTTOM RAILS

- Bottom rail for glass panel system
- Bottom rail for picket infill system

POSTS

- 2 1/2" (63.5 mm) square post
  - 0.080" wall thickness
- 2" (50.8 mm) square post
  - 0.072" wall thickness
- 1 1/2" (38.1 mm) square post
  - 0.065" wall thickness

PICKETS

- 5/8" x 5/8" (15.9 mm) square picket
  - 0.049" wall thickness
- 5/8" x 1 1/2" (15.9 x 38.1 mm) square picket
  - 0.050" wall thickness

FIGURE 2: TYPICAL CROSS-SECTIONS OF COMMON GUARDRAIL ELEMENTS
2.3 ELEMENT AND SYSTEM LOAD CAPACITIES

AA ASM 35 and Parts 1-A and 1-B of the Aluminum Design Manual can be used in determining individual component capacities using conventional engineering design procedures. This method is somewhat conservative and limiting since it does not give consideration to the varying interactions of the elements in determining the load carrying capacity of the guardrail system. Analysis and testing procedures are applied to achieve information for a more efficient design.

Alternatively, aluminum guardrail element and system load capacities can be determined following the applicable provisions of the 2015 International Building Code in Chapter 17 Structural Tests and Special Inspections. BW Vista has conducted an extensive testing program using the services of Intertek Testing Services Na Ltd./Warmock Hershey, some of the results of which are provided in Table 3. Reports of the tests are available upon request. Since test results generally reflect more accurately the actual load carrying capacity of elements and systems, BW Vista recommends the use of test results, where possible, in determining acceptable guardrail designs.

2.4 LOAD DISTRIBUTION

Proper determination of load distribution is a necessary step in the efficient design of guardrail systems. Load distribution is affected by numerous factors, including but not limited to, the stiffness of the top rail relative to the stiffness of the posts, the continuity of the top rail, the length of each straight segment, the total number of spans in a segment, the type of panel infill and the end support conditions. Accurately determining the load distribution characteristics of a guardrail system requires a sophisticated analysis approach. BW Vista has developed specialized computer modelling used to determine the load distribution for its various systems and has performed extensive testing to verify the results.

Analysis and design of unique configurations requires specialized engineering which can be provided by BW Vista. Use of this information in combination with test results is essential for the efficient design of safe guardrail systems.

2.5 ANCHORAGE

Proper anchorage of guardrail posts and rails to a sound and structurally adequate supporting structure is essential for a guardrail system. These elements must be as secure and rigid as possible. A structurally adequate supporting structure is as important as the anchorage elements themselves. One without the other compromises the load carrying capacity and performance of the guardrail system. Building designers and general contractors must be made aware of their responsibility to provide for proper support conditions since this is beyond the normal scope and control of the guardrail system designer and installer.

The anchorage and supporting structure for each post must be designed to carry the applied loads and their associated overturning moments at the post base. These loads comprise of shear, tension and compression forces which must be resisted. Figure 3 indicates some common and approved post base connections.

The anchorage and supporting structure of each top (and bottom) rail to base building components (wall, column, etc) connection must be designed to carry the applied loads transferred from the top and bottom rail. The connection is assumed to provide pivot support with no flexural resistance. Shear loads and, depending upon the system configuration, pullout loads must be resisted. Figure 3 indicates some common and approved top and bottom rail to base building component connections.
### TABLE 3: BW VISTA RAILINGS LTD. TESTING RESULTS

<table>
<thead>
<tr>
<th>Element/Component System</th>
<th>Average Ultimate Load Applied</th>
<th>Mode of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOP RAILS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>872 lbs. (3879 N) total load applied at 1/3 span points</td>
<td>buckling @ load point</td>
</tr>
<tr>
<td>round top rail for glass panel infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>1047 lbs. (4657 N) total load applied at 1/3 span points</td>
<td>buckling @ support</td>
</tr>
<tr>
<td>square top rail for glass panel infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>1054 lbs. (4688 N) total load applied at 1/3 span points</td>
<td>buckling @ load point</td>
</tr>
<tr>
<td>round top rail for picket infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>1261 lbs. (5609 N) total load applied at 1/3 span points</td>
<td>buckling @ support</td>
</tr>
<tr>
<td>square top rail for picket infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOP RAILS WITH SLEEVES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>892 lbs. (3866 N) total load applied at 1/3 span points</td>
<td>fastener tearing inner sleeve flange</td>
</tr>
<tr>
<td>round top rail with inside sleeve for picket infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 1/4&quot; (57.2 mm)</td>
<td>1071 lbs. (4763 N) total load applied at 1/3 span points</td>
<td>bending/deformation of rail ends at midspan connector</td>
</tr>
<tr>
<td>square top rail with outside sleeve for picket infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CORNERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90° round external corner</td>
<td>978 lbs. (4350 N) in tension and shear</td>
<td>bottom inner weld of sleeve mitre tore open</td>
</tr>
<tr>
<td>90° square external corner</td>
<td>670 lbs. (2980 N) in tension and shear</td>
<td>bottom inner weld of sleeve mitre tore open</td>
</tr>
<tr>
<td>135° round external corner</td>
<td>1193 lbs. (5308 N)</td>
<td>bottom inner weld of sleeve mitre tore open</td>
</tr>
<tr>
<td>135° square external corner</td>
<td>958 lbs. (4283 N)</td>
<td>bottom inner weld of sleeve mitre tore open</td>
</tr>
</tbody>
</table>

BW VISTA RAILINGS-8th EDITION-2015
### TABLE 3: BW VISTA RAILINGS LTD. TESTING RESULTS CONTINUED

<table>
<thead>
<tr>
<th>Element/Component System</th>
<th>Average Ultimate Load Applied</th>
<th>Mode of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MISCELLANEOUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/4&quot; (31.8 mm) schedule 40 handrail</td>
<td>344 lbs. (1530 N) total load applied at 1/3 span points</td>
<td>uniform bending failure</td>
</tr>
<tr>
<td>top rail end clip</td>
<td>1447 lbs. (6437 N) in shear</td>
<td>top forward screw pulled laterally out of chase</td>
</tr>
<tr>
<td>bottom channel end clip</td>
<td>1779 lbs. (7915 N) in shear</td>
<td>top forward screw pulled laterally out of chase</td>
</tr>
<tr>
<td>handrail bracket</td>
<td>254 lbs. (1130 N)</td>
<td>bracket yielded</td>
</tr>
<tr>
<td><strong>GLASS PANELS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.25&quot; (6 mm) tempered glass panel 36&quot; (914.4 mm) x 12&quot; (304.8 mm)</td>
<td>215 lbs. (955 N) at midspan edge</td>
<td>fracture</td>
</tr>
<tr>
<td>.25&quot; (6 mm) tempered glass panel 36&quot; (914.4 mm) x 48&quot; (1219.2 mm)</td>
<td>366 lbs. (1627 N) at midspan edge</td>
<td>fracture</td>
</tr>
<tr>
<td>.25&quot; (6 mm) tempered glass panel 36&quot; (914.4 mm) x 48&quot; (1219.2 mm)</td>
<td>92 psf (4.40 kPa) distributed load over entire panel</td>
<td>glass panels slips out of bottom rail</td>
</tr>
<tr>
<td><strong>PICKET</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/8&quot; (15.9 mm) picket</td>
<td>256 lbs. (1140 N) at midspan</td>
<td>weld failure at end connection</td>
</tr>
<tr>
<td>5/8&quot; (15.9 mm) picket panel</td>
<td>696 psf (33.3 kPa) distributed loading</td>
<td>weld failure at end connection</td>
</tr>
<tr>
<td>44&quot; (1118 mm) x 38 1/4&quot; (972mm)</td>
<td>at midspan over 12&quot; (305 mm) x 12&quot; (305 mm) area</td>
<td></td>
</tr>
<tr>
<td><strong>FASTENERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#14 x 2 1/2&quot; screw</td>
<td>2104 lbs. (9359 N) withdrawal</td>
<td>screw pulled out of wood</td>
</tr>
<tr>
<td>secured to solid fir lumber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#14 x 2 1/2&quot; screw</td>
<td>1491 lbs. (6632 N) withdrawal</td>
<td>screw pulled out of wood</td>
</tr>
<tr>
<td>secured to solid spruce lumber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#14 x 2&quot; screw</td>
<td>4821 lbs. (21445 N) withdrawal</td>
<td>restraining bolt tore through the aluminum post</td>
</tr>
<tr>
<td>in post screw chase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#6 x 1 1/2&quot; screw</td>
<td>1120 lbs. (4982 N) withdrawal</td>
<td>screw neck elongated and broke</td>
</tr>
<tr>
<td>in top rail sleeve</td>
<td></td>
<td>below head</td>
</tr>
</tbody>
</table>

**NOTES**
1. Tests conducted by Intertek Testing Services Na Ltd. / Warnock Hersey – reports available upon request.
3. Testing reviewed by Lang Structural Engineering Inc.

BW VISTA RAILINGS-8th EDITION-2015
FIGURE 3: ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS
FIGURE 3 continued: ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS

S-P-F WOOD BLOCKING ANCHORAGE TO MAIN STRUCTURE AND MAIN STRUCTURE LOAD CAPACITY RESPONSIBILITY OF OTHERS
FIGURE 3 continued: ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS

S-P-F WOOD BLOCKING ANCHORAGE TO MAIN STRUCTURE AND MAIN STRUCTURE LOAD CAPACITY RESPONSIBILITY OF OTHERS

BW VISTA RAILINGS - 8th EDITION - 2015
Concrete to be
Min. 4000 psi
(27.6 MPa).

1 1/2" or 2" Post
Side Mount to Concrete

1 1/2" or 2" Post
Side Mount to S-P-F Wood
Floor Joists Perpendicular

Wood blocking anchorage to main structure and
Main structure load capacity responsibility of others.

Figure 3 continued: Acceptable Guardrail Mounting Configurations
CONCRETE TO BE MIN. 4000 psi (27.6 MPa)

1 1/2" OR 2" POST
SIDE MOUNT TO CONCRETE

1 1/2" OR 2" POST
SIDE MOUNT TO S-P-F WOOD
FLOOR JOISTS PERPENDICULAR

1 1/2" OR 2" POST
SIDE MOUNT TO 8-P-F WOOD
FLOOR JOISTS PARALLEL

1 1/2" OR 2" POST
SIDE MOUNT TO S-P-F WOOD
FLOOR JOISTS PARALLEL

FIGURE 3 continued: ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS

BW VISTA RAILINGS - 8th EDITION - 2015
FIGURE 3 continued: ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS

TOP RAIL MOUNT TO WOOD

14 x 2 1/2" SCREW SET IN WOOD BACKING PROVIDED BY OTHERS

TOP RAIL END CLIP

3/16" X 1 3/4" TAPCON SCREW ANCHOR OR 1/4" X 1 3/4" HILTI KWIK BOLT 3 EXPANSION ANCHOR.

TOP RAIL MOUNT TO CONCRETE

BOTTOM RAIL MOUNT TO WOOD

14 x 2 1/2" SCREW SET IN WOOD BACKING PROVIDED BY OTHERS

BOTTOM RAIL END CLIP

3/16" X 1 3/4" TAPCON SCREW ANCHOR OR 1/4" X 1 3/4" HILTI KWIK BOLT 3 EXPANSION ANCHOR.

BOTTOM RAIL MOUNT TO CONCRETE
To assist in design, the maximum service pull-out loads to be resisted by each anchor is summarized below for each type of post and anchorage configuration. These service (allowable) loads have safety factors (3-5) included:

<table>
<thead>
<tr>
<th>Post</th>
<th>Anchorage Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post Configuration</td>
</tr>
<tr>
<td></td>
<td>top mount using BW Vista base plates</td>
</tr>
<tr>
<td></td>
<td>fascia mount to wood using single BW Vista fascia brackets</td>
</tr>
<tr>
<td>1 1/2” (38.1mm)</td>
<td>576 lbs (2562 N) 5 ½” vertical spacing between anchors*</td>
</tr>
<tr>
<td></td>
<td>504 lbs. (2242 N)</td>
</tr>
<tr>
<td></td>
<td>5 ½” vertical spacing between anchors*</td>
</tr>
<tr>
<td>2” (50.8mm)</td>
<td>1092 lbs (4857 N).</td>
</tr>
<tr>
<td></td>
<td>964 lbs. (4228 N)</td>
</tr>
<tr>
<td></td>
<td>5 ½” vertical spacing between anchors*</td>
</tr>
<tr>
<td>2 1/2” (63.5mm)</td>
<td>1692 lbs (7526 N).</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* As per Figure 3

### 2.6 WEAKNESS IN WELDED ALUMINUM

A review of the mechanical properties of aluminum alloys and elements in Table 1 indicates that tensile strength is significantly reduced in aluminum when it is welded. This has a significant impact on the strength capacity of aluminum guardrail components, connections and systems. At the bottom connection of posts to base plates, the connection and post capacity is substantially less in welded configurations compared to those using BW Vista mechanical fastening. Tests conducted by Intertek Testing Services Na Ltd./Warnock Hershey indicate that 38.1mm (1 ½”) posts with welded base plates fail at loads an average of 35% lower than identical posts with BW Vista mechanical base plate connections. Tests conducted by Intertek Testing Services NA Ltd./Warnock Hershey of a 2 ¼” aluminum post of top deck mount configuration (an actual competitor of BW Vista) that uses a welded base plate failed at loads an average of 30% lower than the BW Vista 2” post. A copy of the report can be provided upon request. For these reasons, welded post base connections are generally not recommended.

### 2.7 DESIGN PROCEDURES

#### 2.7.1 Top Rail Design

Top rail design normally involves using conventional engineering design procedures in determining and comparing section resisting moment capacities to resultant bending moments from applied loads. Connections between posts and rails are assumed to provide no flexural restraint. The bending moments in top rails are affected by the number and length of spans between posts in a straight run. Computer analysis of guardrail systems most accurately determines bending moments in top rails. The top rail moment capacity calculated using the section modulus (S) and material yield strength (Fy) (or alternatively from analysis of test results) must exceed the resultant bending moment from the applied loads.
2.7.2 Post Design

Posts in railing systems behave somewhat as vertical cantilevered beams in resisting horizontal loads applied to the top rail. Bending moments caused by horizontal loads normally control allowable post spacing and design. The first step in post design is determining the actual horizontal load that each post would be expected to carry. Horizontal load distribution from the top rail to each post is affected by a number of factors including the relative stiffness of the post and top rail, the length of each straight run, the number of spans in the railing, and the end support conditions.

Computer modelling and analysis based on test results of guardrail systems most accurately assimilates top rail load distribution to each of the supporting posts and end conditions. The post moment capacity is calculated using the section modulus (S) and material yield strength (Fy). This must exceed the resultant bending moment from the applied loads or the post spacing is reduced to create an acceptable condition.

3.0 DESIGN TABLES

The design procedures described in the previous section have been carried out for a wide range of possible guardrail configurations. The results are summarized in the tables which follow. By knowing the overall dimensions and layout of the guardrail system under design, an acceptable configuration can be selected using the tables.

The design tables are based upon the loading criteria set out in the 2015 International Building Code section 1607.8.1 Handrails and guards. The actual load conditions for the guardrail system under design must be identical to or less than those used in the development of the tables. The tables should not be used for other applications where different loading conditions and configurations exist.

3.1 WIND LOADING

For glass infill guardrail systems, the structural strength requirements imposed by design wind loading may exceed those imposed by specified guardrail design loads. Guardrail design loads (as specified in the 2015 International Building Code) of 20 plf and 50 plf top rail load are the governing criteria for 42” (1067 mm) high guardrail system designs when compared to uniform lateral specific wind pressures of not greater than 12.7 psf and 28.7 psf respectively. The respective allowable guardrail configurations provided in figures 4 are all capable of withstanding this uniform lateral specific wind pressures.

The procedure for determining net design wind pressures, \( p_{net} \), for the components and cladding of building is provided in subsection 1609.6.4.1 Components and Cladding of the 2015 International Building Code Section 1609 Wind Loads and Chapter 6 of ASCE 7. Using the code provisions, a 12.7 psf (0.61kPa) net design wind pressure is given for the following conditions:
- Exposure B – Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of anchor type of exposure.
- Mean roof height of 30 feet (9.144m) or less
- Important factor of 1.0
- 50 sq.ft. (4.645m²) effective wind area
- 85 mile per hour (37.4 m/s) nominal design 3-second gust wind speed.

Many residential guardrail conditions fit within these criteria. Consult the 2015 International Building Code and local building jurisdictional authorities where other conditions apply for determination of the net design wind pressure.
For wind pressure greater than 12.7 psf, adjust the allowable post spacing based on a
20 plf top rail load using the following formula:

\[
\frac{\text{modified post spacing}}{\text{allowable post spacing}} = \frac{12.7}{12.7}\text{ in psf}
\]

For wind pressure greater than 28.7 psf, adjust the allowable post spacing based on a
50 plf top rail load using the following formula:

\[
\frac{\text{modified post spacing}}{\text{allowable post spacing}} = \frac{28.7}{28.7}\text{ in psf}
\]

3.2 GUARDRAIL HEIGHT VARIATIONS

The most common guardrail system height is 42" (1067 mm). For guardrail heights other than 42"
(1067 mm), adjust the allowable post spacings as indicated in the allowable guardrail configurations
of figures 4 using the following formula:

\[
\frac{\text{modified post spacing}}{\text{allowable post spacing}} = \text{allowable post spacing multiplier}
\]

(see table below)

<table>
<thead>
<tr>
<th>Guardrail Height (in)</th>
<th>Allowable Post Spacing Multiplier for Picket Infill Guardrail</th>
<th>Allowable Post Spacing Multiplier for Glass Infill Guardrail</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; (457 mm)</td>
<td>2.33</td>
<td>2.33</td>
</tr>
<tr>
<td>24&quot; (610 mm)</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>30&quot; (762 mm)</td>
<td>1.40</td>
<td>1.40</td>
</tr>
<tr>
<td>36&quot; (914 mm)</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>42&quot; (1067 mm)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>48&quot; (1219 mm)</td>
<td>0.88</td>
<td>0.76</td>
</tr>
<tr>
<td>54&quot; (1372 mm)</td>
<td>0.78</td>
<td>0.60</td>
</tr>
<tr>
<td>60&quot; (1524 mm)</td>
<td>0.70</td>
<td>0.49</td>
</tr>
<tr>
<td>66&quot; (1676 mm)</td>
<td>0.64</td>
<td>0.40</td>
</tr>
<tr>
<td>72&quot; (1829 mm)</td>
<td>0.58</td>
<td>0.34</td>
</tr>
</tbody>
</table>

3.3 GUARDRAIL SYSTEMS WITH ALUMINUM PICKET INFILL

Corner posts for aluminum picket infill guardrail systems may be eliminated and replaced with a
picket corner provided one of the following conditions are met:

1) the end of the return portion of the top rail is anchored to the building, or

2) the return portion of the guardrail system is supported by a minimum of 2 posts.
3.4 GUARDRAIL SYSTEMS WITH GLASS PANEL INFILL

Post spacing for guardrail systems is generally determined by the strength of the supporting posts and applied loads. However, for guardrail systems with glass panel infill, consideration must be given to the size of the glass panels. Although testing has shown that glass panels supported by the top and bottom rails meet code requirements regardless of length of run, for practical purposes from the point of view of the installer, glass panel infills should be limited to not greater than 5'-6" (1676 mm) in length.

3.5 FASCIA MOUNTED POSTS

Guardrail systems using fascia or side mounted posts instead of top mounted posts are becoming more widely used. These systems have the advantage of not penetrating the building envelope. Furthermore, test results for fascia or side mounted posts have produced higher load values for the same posts in top mounted configurations. Consequently the post spacing indicated for the allowable configurations in figure 4 may be increased using the following multiplies:

<table>
<thead>
<tr>
<th>modified post spacing</th>
<th>allowable post spacing multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ½&quot; (38.1 mm) square post</td>
<td>1.10</td>
</tr>
<tr>
<td>2&quot; (50.8 mm) square post</td>
<td>1.12</td>
</tr>
</tbody>
</table>
File No. 112-064

December 15, 2015

BW Vista Railings
23282 River Road
Maple Ridge, B.C.
Canada V2W 1B6

Attention: Mr. Ed Granholm

RE: ALUMINUM GUARDRAIL SYSTEMS
BUILDING CODE COMPLIANCE

As requested, a series of 42" high allowable guardrail configurations infilled with ¼" tempered glass or pickets and acceptable guardrail mounting configurations have been determined and are assembled on pages 23 to 45 inclusive and pages 12 to 17 inclusive respectively of the American BW Vista Railings 8th Edition Aluminum Guardrail Systems Design Manual. These configurations are in conformance with the structural load requirements for balcony guardrails as specified in the following code:

- 2015 International Building Code section 1607.8.1 Handrails and guards

The seals applied are current for details and tables assembled for the codes indicated above. Annual resealing of these documents is not necessary.

Contact us with any further questions concerning this.

Yours truly,
LANG STRUCTURAL ENGINEERING INC.

Bill Louwerse, P.Eng., Struct.Eng., PE
BL/jk
### TYPE 1 - FREE-STANDING

**TYPE 1A - END CONDITIONS**
- 2" POST EACH END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 1B - END CONDITIONS**
- 2-1/2" POST EACH END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 1C - END CONDITIONS**
- 2" POST EACH END
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

**TYPE 1D - END CONDITIONS**
- 2-1/2" POST EACH END
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

**TYPE 1E - END CONDITIONS**
- 2-1/2" POST EACH END
- INTERMEDIATE CONDITIONS: 2-1/2" POSTS EVENLY SPACED

### TYPE 2 - PARTIAL FIXED ONE END

**TYPE 2A - END CONDITIONS**
- 45" CORNER w/ MIN 1-1/2" POST
- AND 2-1/2" POST AT END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 2B - END CONDITIONS**
- 45" CORNER w/ MIN 2-2" POSTS
- & 2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

### TYPE 3 - FIXED ONE END

**TYPE 3A - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 1-1/2" POST
- AND 1-2" POST AT END & 2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 3B - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 1-1/2" POST
- AND 1-2" POST AT END & 2-1/2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 3C - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 2-2" POSTS
- & 2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

**TYPE 3D - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 2-2" POSTS
- & 2-1/2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

### TYPE 4 - PARTIAL FIXED BOTH ENDS

**TYPE 4A - END CONDITIONS**
- 45° CORNERS w/ MIN 1-1/2" POST
- AND 1-2" POST AT END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 4B - END CONDITIONS**
- 45° CORNERS w/ MIN 2-2" POSTS
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

### TYPE 5 - FIXED & PARTIAL FIXED ENDS

**TYPE 5A - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 1-1/2" POST
- AND 1-2" POST AT END & 45° CORNER w/ MIN 1-1/2" POST
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 5B - END CONDITIONS**
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 2-2" POSTS & 45° CORNER w/ MIN 2-2" POSTS
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

### TYPE 6 - FIXED BOTH ENDS

**TYPE 6A - END CONDITIONS**
- TOP RAIL END CLIPS TO STRUCTURE OR 90° CORNERS w/ MIN 1-1/2" POST
- AND 1-2" POST AT END
- INTERMEDIATE CONDITIONS: 1-1/2" POSTS EVENLY SPACED

**TYPE 6B - END CONDITIONS**
- TOP RAIL END CLIPS TO STRUCTURE OR 90° CORNERS w/ MIN 2-2" POSTS
- INTERMEDIATE CONDITIONS: 2" POSTS EVENLY SPACED

---

**FIGURE 4: GUARDRAIL CONFIGURATIONS**

BW VISTA RAILINGS - 8th EDITION - 2015
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP 1-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 30.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4A: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1A

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNock HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1
TYPE 1A ALTERNATE
OPTIONAL CONFIGURATIONS
w/ 2” POSTS ADDED
IN INTERMEDIATE SPACES

TYPE 1 – FREE-STANDING

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/ANSIA MOUNT CONDITIONS FOR BOTH 1/4” TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNock HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDBRAINS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.
Vista Design Manual — AMERICAN .../26

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TYPE 1 — FREE-STANDING

TYPE 1B — END CONDITIONS — 2-1/2" POST EACH END
INTERMEDIATE CONDITIONS — 1-1/2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND

POST SIZES

1-1/2" 2" 2-1/2"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:

—CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/RASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
—ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNock HERSEY.
—ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

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OREGON

FIGURE 4B: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1B

BW VISTA RAILINGS - 8th EDITION - 2015
TYPE 1B ALTERNATE
OPTIONAL CONFIGURATIONS
w/ 2" POSTS ADDED
IN INTERMEDIATE SPACES

25'-0"
6'-3"

35'-0"
7'-0"

50'-0"
6'-6"

40'-10"
5'-10"

45'-4"
5'-8"

50'-0"
5'-0"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.6.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES
FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT
  (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH
  1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS,
  CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK
  TESTING SERVICES NA LTD./WARNICK HERSEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE
  APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015
  INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4B-A: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1B-ALTERNATE

BW VISTA RAILINGS - 8TH EDITION - 2015
TYPE 1 - FREE-STANDING

TYPE 1C - END CONDITIONS
- 2" POST EACH END
INTERMEDIATE CONDITIONS - 2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2" 2" 2-1/2"
POST SIZES

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDBRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS ShOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS ShOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNOCK HEERSHY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4C: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1C
TYPE 1 – FREE-STANDING

TYPE 1D – END CONDITIONS
- 2-1/2" POST EACH END
INTERMEDIATE CONDITIONS - 2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE
OF THE DESIGN MANUAL FOR DETAILS
REGARDING ACCEPTABLE GUARDRAIL
MOUNTING CONFIGURATIONS AND
MAXIMUM SERVICE PULL-OUT LOAD
REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2" 2" 2-1/2"
POST SIZES

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES
FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT
  (AS SHOWN) AND SIDE/PASCIA MOUNT CONDITIONS FOR BOTH
1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS,
  CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK
  TESTING SERVICES NA LTD./WARNOCK HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE
  APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015
  INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4D: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1D

BW VISTA RAILINGS - 8th EDITION - 2015
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I,II,III,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES LTD./WARNOCK HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMITY WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4E: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 1E
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDBRIGS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SID/E/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARD RAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTECH TESTING SERVICES LTD./WARNOCK HERSEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMITY WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

FIGURE 4F: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 2A

BW VISTA RAILINGS - 8TH EDITION - 2015
TYPE 2 – PARTIAL FIXED ONE END

TYPE 2B – END CONDITIONS – 45° CORNER w/ MIN 2-"2" POSTS & 2" POST OPPOSITE END
INTERMEDIATE CONDITIONS – 2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE
OF THE DESIGN MANUAL FOR DETAILS
REGARDING ACCEPTABLE GUARDRAIL
MOUNTING CONFIGURATIONS AND
MAXIMUM SERVICE PULL-OUT LOAD
REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2" 2" 2-1/2"
POST SIZES

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES
FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
– CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT
(AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH
1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
– ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS,
calculations and results of tests conducted by INTERTEK
TESTING SERVICES N.A./WARNOCK HERSHEY.
– ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE
APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015
INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4G: 42’ HIGH ALLOWABLE CONFIGURATIONS TYPE 2B
TYPE 3 - FIXED ONE END

TYPE 3A - END CONDITIONS - TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 1-1/2" POST AND 1-2" POST AT END & 2" POST OPPOSITE END INTERMEDIATE CONDITIONS - 1-1/2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2" 2" 2-1/2"
POST SIZES

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4 TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNOCK HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMITY WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4H: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 3A

BW VISTA RAILINGS - 8th EDITION - 2015
TYPE 3A ALTERNATE
OPTIONAL CONFIGURATIONS
w/ 2" POSTS ADDED
IN INTERMEDIATE SPACES

TYPE 3 - FIXED ONE END

TYPE 3A - END CONDITIONS - TOP RAIL END CLIP TO STRUCTURE
OF 8" DECK TOP 1-1/2" POST
WEAVING 2-3/8" POST AT END
& "A" POST OPPOSITE END
INTERMEDIATE CONDITIONS - 1-1/2" POSTS EVENLY SPACED

SEI FIGURE 3 AND SECTION 5.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2" 2" 2-1/2"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDBRIGS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3, P, H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNOC HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMITY WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4H-A: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 3A-ALTERNATE

BW VISTA RAILINGS - 8th EDITION - 2015
TYPE 3 - FIXED ONE END

TYPE 3B - END CONDITIONS
- TOP RAIL END CLIP TO STRUCTURE OR 90° CORNER w/ MIN 1-1/2" POST AND 1-2" POST AT END & 2-1/2" POST OPPOSITE END
- INTERMEDIATE CONDITIONS - 1-1/2" POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND

POST SIZES
1-1/2" 2" 2-1/2"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND POCKET GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNICK HERSEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4I: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 3B

BW VISTA RAILINGS - 8th EDITION - 2015
TYPE 3B ALTERNATE
OPTIONAL CONFIGURATIONS
w/ 2" POSTS ADDED
IN INTERMEDIATE SPACES

25'-0"
6'-3"

35'-0"
7'-0"

39'-0"
6'-6"

40'-10"
5'-10"

45'-4"
5'-8"

45'-0"
5'-0"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDBRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,P,H AND S OCCUPANCIES
FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/8" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD., WARRICK, HERSEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 41-A: 42' HIGH ALLOWABLE CONFIGURATIONS TYPE 3B-ALTERNATE

BW VISTA RAILINGS - 8th EDITION - 2015
FIGURE 4J: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 3C

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTEK TESTING SERVICES NA LTD./WARNOCK HERSEY
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING FOR CONDITIONS NOT MENTIONED ABOVE
TYPE 3 – FIXED ONE END

TYPE 3D – END CONDITIONS
- TOP RAIL END CLIP TO STRUCTURE OR 80° CORNER WITH MIN 2” POSTS
- 2-1/2” POST OPPOSITE END
- INTERMEDIATE CONDITIONS – 2” POSTS EVENLY SPACED

SEE FIGURE 3 AND SECTION 2.5 ANCHORAGE OF THE DESIGN MANUAL FOR DETAILS REGARDING ACCEPTABLE GUARDRAIL MOUNTING CONFIGURATIONS AND MAXIMUM SERVICE PULL-OUT LOAD REQUIREMENTS FOR ANCHORS.

POST LEGEND
1-1/2” 2” 2-1/2”

POST SIZES

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH 1/4” TEMPERED GLASS (AS SHOWN) AND POCKET GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARNock HERSEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015 INTERNATIONAL BUILDING CODE SECTION 1607.8.1.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4K: 42” HIGH ALLOWABLE CONFIGURATIONS TYPE 3D
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

ASPER 2015 IBC SECTION 1607.8.1 HANDBRACKS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4L: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 4A

NOTES:

- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR both
1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS,
CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK
TESTING SERVICES LTD./WARNOW HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE
APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015
INTERNATIONAL BUILDING CODE SECTION 1607.8.1
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR THE EXTERIOR OF DwELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC UNDER ANY OCCUPANT LOAD NO GREATER THAN 55.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4M: 42' HIGH ALLOWABLE CONFIGURATIONS TYPE 4B
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2017 IBC SECTION 1607.8.2. HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NOT EXCEEDING 50.

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/FASCIA MOUNT CONDITIONS FOR BOTH FIXED AND PARTIAL FIXED END GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS, CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK TESTING SERVICES NA LTD./WARRICK HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2016 INTERNATIONAL BUILDING CODE SECTION 1607.8.1

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4N: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 5A

BW VISTA RAILINGS - 8th EDITION - 2015
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDRAILS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3, F, H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4P: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 6A

BW VISTA RAILINGS - 8th EDITION - 2015
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDRAILS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 4P: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 6A
BW VISTA RAILINGS - 8th EDITION - 2015
20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

50 LBS/FOOT OR 200 LBS. TOP RAIL LOADING

FOR CONDITIONS NOT MENTIONED ABOVE

FIGURE 40: 42" HIGH ALLOWABLE CONFIGURATIONS TYPE 6B

BW VISTA RAILINGS - 8TH EDITION - 2015
TYPE 6B ALTERNATE
OPTIONAL CONFIGURATIONS
w/ 2" POSTS ADDED
IN INTERMEDIATE SPACES

24'-8"
6'-2"

36'-0"
7'-4"

39'-0"
6'-6"

40'-10"
5'-10"

45'-4"
5'-6"

45'-0"
5'-0"

20 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
AS PER 2015 IBC SECTION 1607.8.1 HANDRAILS AND GUARDS FOR ONE AND TWO FAMILY DWELLINGS AND IN GROUP I-3,F,H AND S OCCUPANCIES
FOR AREAS THAT ARE NOT ACCESSIBLE TO THE GENERAL PUBLIC AND THAT HAVE AN OCCUPANT LOAD NO GREATER THAN 50.

25 LBS/FOOT OR 200 LBS. TOP RAIL LOADING
FOR CONDITIONS NOT MENTIONED ABOVE

NOTES:
- CONFIGURATIONS SHOWN ACCEPTABLE FOR TOP MOUNT (AS SHOWN) AND SIDE/TASOA MOUNT CONDITIONS FOR BOTH
  1/4" TEMPERED GLASS (AS SHOWN) AND PICKET GUARDRAIL SYSTEMS.
- ALLOWABLE CONFIGURATIONS ARE BASED UPON ANALYSIS,
  CALCULATIONS AND RESULTS OF TESTS CONDUCTED BY INTERTEK
  TESTING SERVICES NA LTD./WARPICK HERSHEY.
- ALLOWABLE CONFIGURATIONS ARE IN CONFORMANCE WITH THE
  APPLICABLE STRUCTURAL REQUIREMENTS SPECIFIED IN THE 2015
  INTERNATIONAL BUILDING CODE SECTION 1607.8.1

FIGURE 4Q-A: 42' HIGH ALLOWABLE CONFIGURATIONS TYPE 6B ALTERNATE

BW VISTA RAILINGS - 8th EDITION - 2015