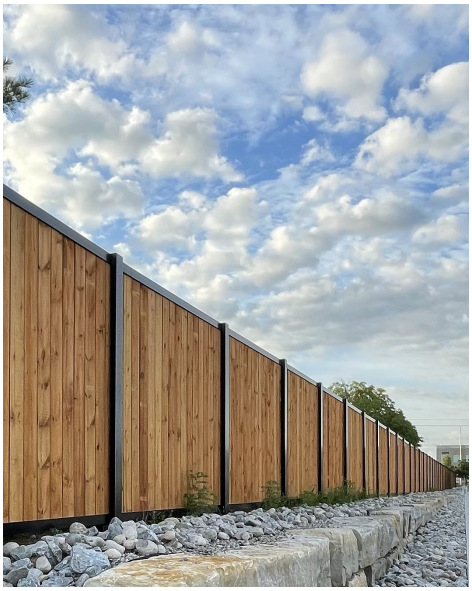
ALCUF FENCING SYSTEMS

Since 1974



Alcuf Fencing Systems are aluminum frameworks that allow you to step or follow land contours, cantilever sections, adjust for elevation, all with less labour than conventional systems. They are extruded with an aircraft strength alloy, and are 100% recyclable and 100% reusable and will never rust or rot.

Various infill can be used, but when used with wood there are no nails, wood is free to expand and contract within the frame without working itself loose. Water cannot stay within the frame so wood dries quickly and is protected from the combination of bacteria and moisture which causes rot. As a result, we have been able to achieve an extraordinary service life. Alcuf Framework 40+ years - Aluminum infill 40+ years - Wood infill, 30+ years. These are not estimates, these are actual historic achievements in Canada.

Regardless of the type of wood used with conventional fencing, posts will warp and also rot at the point of contact with the ground. Horizontal rails often rot at connections, and warp. Alcuf Aluminum extruded frameworks never will. The posts which are the most costly part of your fencing investment will last indefinitely keeping their new appearance and functionality for decades to come.

alcuf.com

Alcuf Fencing Systems have an extraordinary high quality that is visually apparent. The system design allows you to select from a wide variety of infill to suit your requirements. This allows you to apply our design to a specific application, but also allows for the integration of a variety of infill on the same site in different locations to satisfy various site requirements.

Today with intense pressure to optimize property development costs, architects are looking for intelligent designs that provide long-term performance with minimum maintenance. That, in fact, is the very definition of an Alcuf Product.

Features and Benefits

Compared to competitive products, Alcuf…

- ◊ is Aluminum and does not rust or rot by nature;
- ◊ does not need large equipment to install; this means
- ◊ less personnel, and less time on site;
- ◊ smaller installation vehicles due to its light weight;
- ◊ by design requires less labour for the finishing stages;
- ◊ is completely adjustable for future elevation changes;
- ◊ is convertible and reusable;
- ◊ and is 100% recyclable;
- ◊ has a variety of infill alternatives;
- ◊ has the lowest total life cycle cost as compared to other alternatives in every product line class.

Aluminum is not only a renewable resource, and one of the longest lasting materials, but 75 percent of all aluminum produced since 1888 is still in use!

Source: The Aluminum Association (also from Alcoa and multiple other reliable sources)

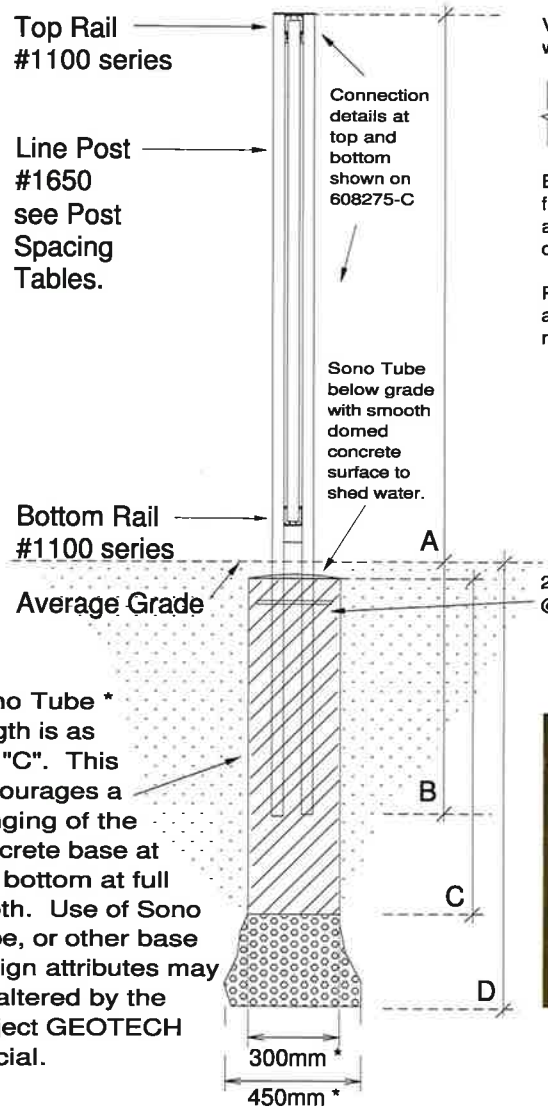
Architects and Engineers can find technical information on our web site enabling them to specify Alcuf for Noise Barriers, Privacy Fencing, Security Fencing, and other uses.

Alcuf International Inc. has a network of authorized dealers in Canada, who have been carefully trained with the know how to install your Alcuf system professionally and cost effectively. Our dealers sell Alcuf on an installed only basis, this way we control the quality and performance that will be delivered to you.

AUTHORIZED ALCUF DEALER

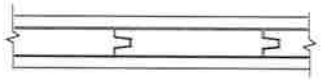
Alcuf International Inc.
6178 Mitch Owens Rd., Ottawa, Ontario, Canada K4M 1B2
www.alcuf.com

End View



Top View

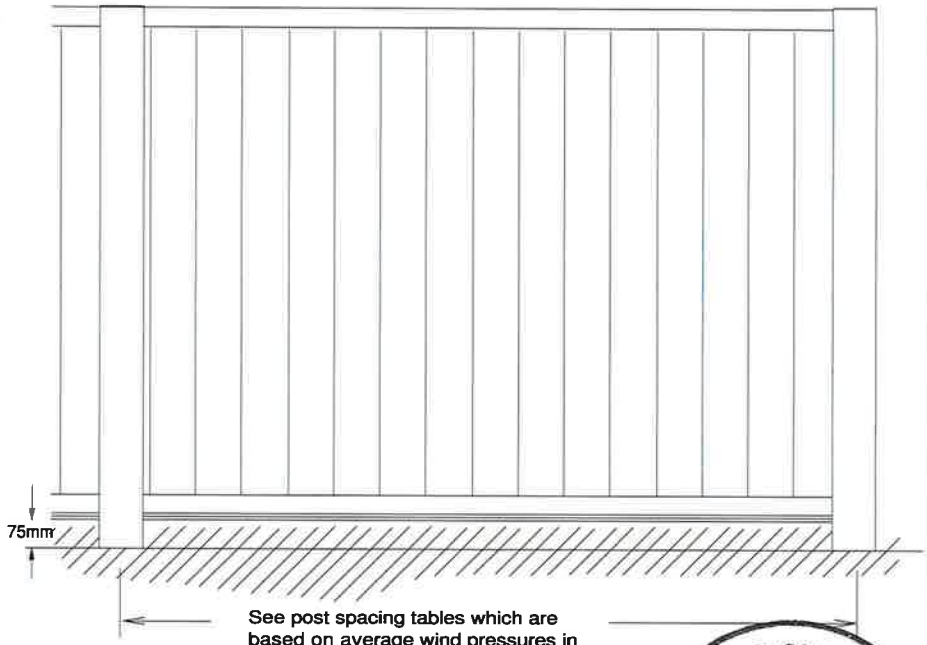
Various Infills fit into the Horizontal Rails which match their thicknesses.



Example: Wood infill, the widths range from 5" to 6" of premium grade tongue and groove wood, with a moisture content of 19% or less.

Rail sizes, dimensions, and infill options are found on 608275-B. Infill openings range as follows; .75" and 1".

Side View



See post spacing tables which are based on average wind pressures in your region on drawing 608275-G.

FENCE HEIGHT (mm)	POST DEPTH IN FOOTING (mm)	SONO TUBE LENGTH (mm)	FOOTING DEPTH (mm)
"A" 1800 (6'-0")	"B" 800	"C" 1200	"D" 1520
"A" 2130 (7'-0")	"B" 800	"C" 1500	"D" 1800

NOTES:

Concrete strength @ 28 days: F'c=25 MPa
Exposure 6% +/-1% Air Entrainment.

* Footing dimensions shown are a minumum typical size for optimum Eastern Canadian soil conditions.
* Consult the Geotechnical Engineer for your specific site for confirmation of our minimum design above, or alternate foundation design.

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept-20/22
PROVINCE OF ONTARIO

ENGINEERING BY:
BUCHAN, LAWTON, PARENT LTD
Consulting Engineers
5-5370 Canotek Road, Ottawa, Ontario K1J 9E6
www.blp.ca

This drawing set consists of parts A to G.

Alcuf DP1 Privacy

DATE: 2022-06-10

DRAWING NUMBER: 608275-A

REV: 3.2

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

Project Details:

DP1 Frameworks and Infill Options (up to 7' high)

This drawing set consists of parts A to G.

END VIEW

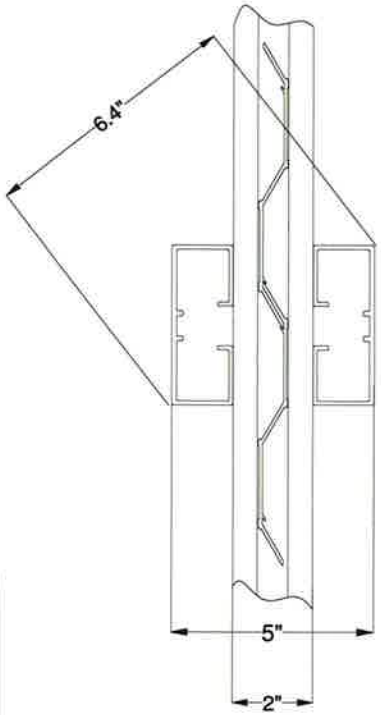
(basic dimensions)

#1177 Rail for .75" infill

#1179 Rail for 1" infill

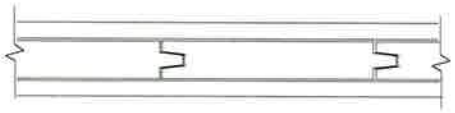
TOP VIEW

(basic dimensions)

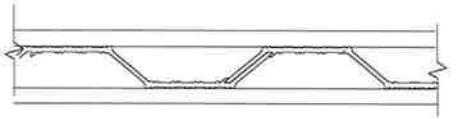


Shown: #1177 Rail with .75" #8000 Aluminum Panel infill
#1650 Post (2pc) for #1177/79 Rails

Various Infills can fit into the Horizontal Rails.



For Wood infill, the widths range from 5" to 6" of premium grade tongue and groove wood, with a moisture content of 19% or less.



Alcuf Extruded Panels (AEP) are aluminum panels locked together forming a continuous infill. AEP in DP1 requires a .75" rail infill opening (#1177).

Infill Options

Infill can range in scope from wood, to composite panels, to high strength extruded 6005 aluminum alloy panel, our premium infill.

Wood: For minimum maintenance using wood, it is best to leave it unstained. This provides a naturally weathered (and dry) wood infill, in a modern looking framework.

Another option is "Pressure Treated Kiln Dried wood". This is the most practical way to add colour to your wood, without the need to constantly restain. By Kiln Drying the wood first, you achieve a greater penentration from the Pressure Treatment. This is an important step to making Pressure Treating effective.

The Alcuf Extruded Panel (AEP): The Alcuf Extruded Panels are available in virtually any colour. These are extruded like the post and rails and other aluminum elements in the system. Because the AEP is extruded, it is extremely strong and very resistant to dents.

Stock framework colour is Black, other colours are available.

Alcuf DP1 Privacy

DATE: 2022-06-10		DRAWING NUMBER: 608275-B
REV: 3.2	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP1 Connections and Assembly Details

This drawing set consists of parts A to G.

Figure 1 End View of assembled post with rails in place ready for infill.

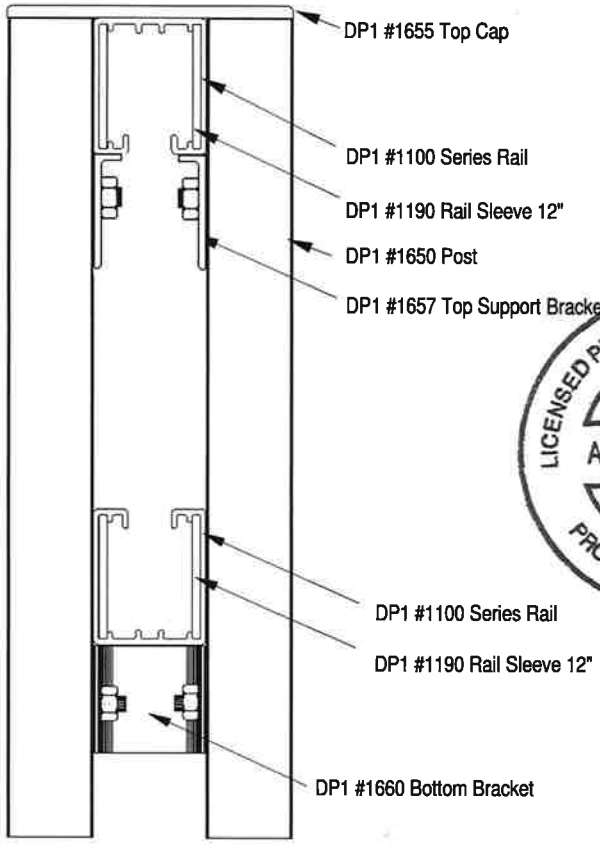


Figure 2 End View of assembled post ready to set in concrete

Figure 3 Post Cap slides down into top of posts

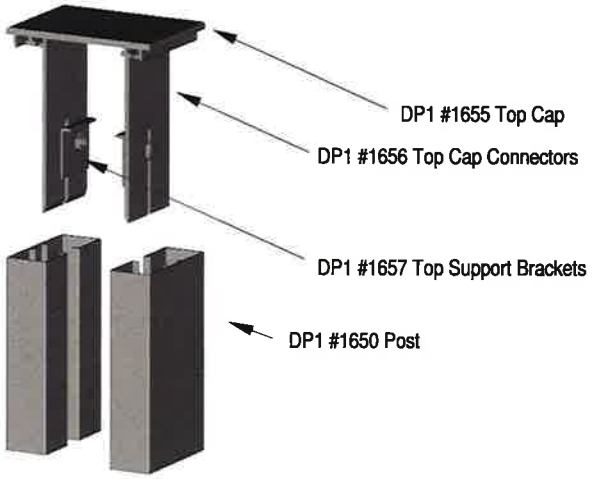
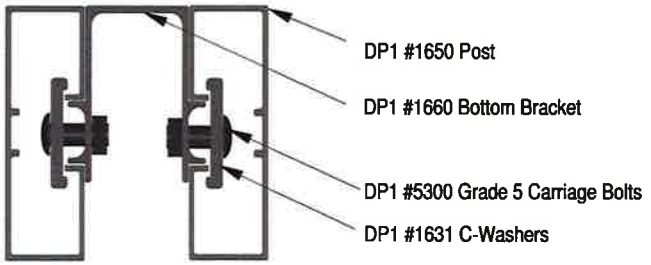


Figure 4 Top view of posts connected with Bottom Bracket



In Figure 1 we see an end view of the basic framework. Posts are assembled using the Post Cap shown in Figure 3, and the Bottom Bracket shown in Figure 4. Top Caps and Bottom Brackets are secured in place using grade 5 bolts and square washers shown in Figure 4. In Figure 4 we can see the Bottom Bracket in a top down view. Both the Bottom Bracket and the Post Cap insure that the two pieces are assembled at the right distance apart for setting in concrete, and then receiving top and bottom rails.

In Figure 2 we show an end view of the post assembly. Posts are assembled before they are set in concrete. Once set, the top cap is removed, and rails are mounted. Once the top cap is replaced and secured in place, you're ready to insert infill.

All nuts and bolts are 5/16" Grade 5 Carriage Bolts with a YELLOW ZINC RICH CHROMATE coating ASTM B-117.

Alcuf DP1 Privacy

DATE: 2022-06-10

REV: 3.1 | SCALE: none

DRAWING NUMBER: 608275-C

Alcuf International Inc.
Ottawa, Ontario, Canada
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DRAWN BY: designs@alcuf.com

DP1 Other Rail Connections

This drawing set consists of parts A to G.

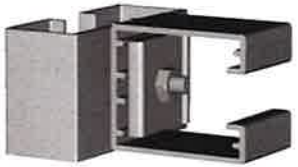
Figure 1

Connections: 2 way

Figure 2

3 way

Figure 3



4 way

Figure 4

4 way on an angle

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

3 Way Connections and 4 Way Connections are easy because the rails are designed to fit inside themselves and act as mounting brackets (F1 and F2). The Post and Rail both have two fins right at the point where a hole can be drilled, reinforcing the shape walls avoiding weakness which would result otherwise (F4). The grade 5 bolt head would reside inside the Post where it will not interfere with the Post Cap, and the nut would be supported by a C-Washer inside the rail (F3).

Note these brackets can be mitred for angle connections.

Alcuf DP1 Privacy

DATE: 2022-06-10		DRAWING NUMBER: 608275-D
REV: 3.1	SCALE: none	
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DP1 Sleeve Details and Expansion Gap Table

This drawing set consists of parts A to G.

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Sept. 20/22
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Expansion Gap Table

Installation Temperature		
		Gap in inches
Celsius	Fahrenheit	(for 20' rails)
-20	-5	3/8
-15	0	3/8
-10	10	5/16
-5	20	5/16
0	30	1/4
5	40	1/4
10	50	1/4
15	60	3/16
20	70	3/16
25	80	3/16
30	90	1/8
35	100	1/8

Sleeve location and Rail Expansion

Rail sleeves must be no more than 12 inches from a post. The slip-fit between one half of the sleeve and the adjoining rail allows for the expansion and contraction that will occur. This is why the sleeve is fastened (riveted) to only one rail, and not both. The sleeve connection also provides an additional drainage point.

It is important to leave an expansion gap at each sleeve connection, to allow for expansion and contraction of the framework at different temperatures of the year. The Expansion Gap Table provides the Gap required depending on the temperature at the time of installation.

Alcuf DP1 Privacy

DATE: 2022-06-10

DRAWING NUMBER: 608275-E

REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY: designs@alcuf.com

DP1 Post Finishing

This drawing set consists of parts A to G.

Post Edge Caps are used at Terminal Posts to terminate and retain the continuous flow of Infill.

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A.T. HIGGINSON
Sept-20/22
PROVINCE OF ONTARIO

Alcuf DP1 Privacy

DATE: 2022-06-10		DRAWING NUMBER: 608275-F
REV: 3.1	SCALE: none	

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

DP1 Post Spacing Table

This drawing set consists of parts A to G.

Location	Hourly Wind Pressure (kPa)	Design Wind Pressure (kPa)	DP1 Series Minimum Rail/Post	5'=1.5m Meter	5'=1.5m Feet	6'=1.8m Meter	6'=1.8m Feet	7'=2.1m Meter	7'=2.1m Feet
Calgary	0.48	1.57	1100/1650	3.05	10	2.74	9	1.98	6.5
Edmonton	0.45	1.47	1100/1650	3.05	10	3.05	10	2.13	7
Halifax (Region)	0.58	1.9	1100/1650	3.05	10	2.29	7.5	1.68	5.5
Montreal (Region)	0.42	1.38	1100/1650	3.05	10	3.05	10	2.29	7.5
Ottawa (Metropolitan)	0.41	1.34	1100/1650	3.05	10	3.05	10	2.44	8
Quebec city (region)	0.41	1.34	1100/1650	3.05	10	3.05	10	2.44	8
Saskatoon	0.43	1.41	1100/1650	3.05	10	3.05	10	2.29	7.5
Toronto (Metropolitan)	0.44	1.44	1100/1650	3.05	10	3.05	10	2.29	7.5
Toronto (Scarborough)	0.47	1.54	1100/1650	3.05	10	2.90	9.5	2.13	7
Vancouver (Burnaby)	0.47	1.54	1100/1650	3.05	10	2.90	9.5	2.13	7
Vancouver (Cloverdale, Haney, Langley, New Westminster, Surrey)	0.44	1.44	1100/1650	3.05	10	3.05	10	2.29	7.5
Vancouver (Ladner)	0.46	1.51	1100/1650	3.05	10	2.90	9.5	2.13	7
Vancouver (North Vancouver, Richmond, City Hall, Granville & 41 ave)	0.45	1.47	1100/1650	3.05	10	3.05	10	2.13	7
Vancouver (West Vancouver)	0.48	1.57	1100/1650	3.05	10	2.74	9	1.98	6.5
Winnipeg	0.45	1.47	1100/1650	3.05	10	3.05	10	2.13	7

Note: For more post spacing detail, consult our provincial charts. These are available on request from design@alcuf.com.

If you know the kPa Hourly Wind Presure value in a specifc area, we can tell you what the post spacing should be for DP1, 2, or 3 anywhere in Canada.

1. Hourly average wind pressure, in kPa are listed in the supplement to the National Building Code of Canada (2015) Climatic Information for building design in Canada, using the hourly wind pressure 1/50.
2. Fence infill material has been assumed to have a max surface density of 24 kg/m^2 and 100% solid coverage.
3. The design wind pressure are calculated using a load factor of 1.4, a gust effect factor of 2.5, a open terrain exposure factor of 0.9, a force coefficient of 1.3, and an importance factor of 0.8.
4. Post and rail sections are extruded Aluminum shapes using alloy 6005, with a minimum yield strength of 240 MPa.
5. Post (DP1 1650 series) and Rail (DP1 1100 series) sections checked for strength in accordance with S157-05/S157.1-05 (reaffirmed 2015), Strength design in Aluminum.
6. Structural Engineering by: Alasdair Higginson P.Eng, ahigginson@blp.ca
7. Reference: https://nrc-publications.canada.ca/eng/view/object/?id=c8876272-9028-4358-9b42-6974ba258d99

ENGINEERING BY:

BUCHAN, LAWTON, PARENT LTD
Consulting Engineers
5-5370 Canotek Road, Ottawa, Ontario K1J 9E6
www.blp.ca

Alcuf DP1 Privacy

DATE: 2022-06-10

DRAWING NUMBER: 608275-G

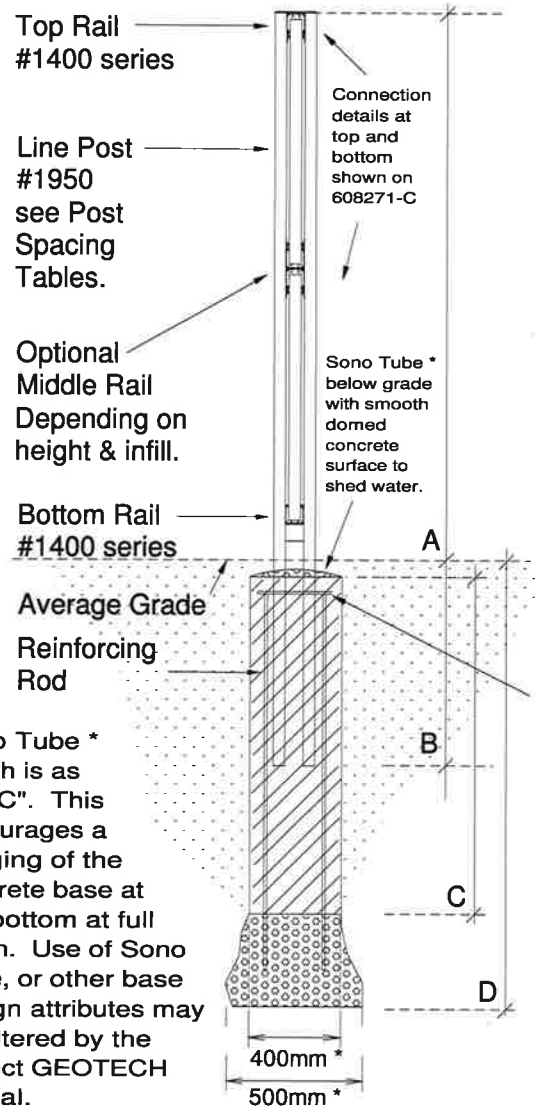
REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

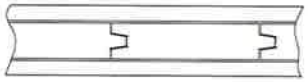
End View



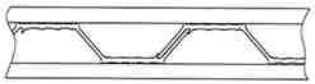
Sono Tube * length is as per "C". This encourages a flanging of the concrete base at the bottom at full depth. Use of Sono Tube, or other base design attributes may be altered by the project GEOTECH official.

Top View

Infill is designed to fit into the Horizontal Rails for various widths.



For Wood, the widths and species must provide adequate mass to achieve the intended noise transmission loss, and to last for decades of service. See Drawings 1910251 and 2206101 for more detail.



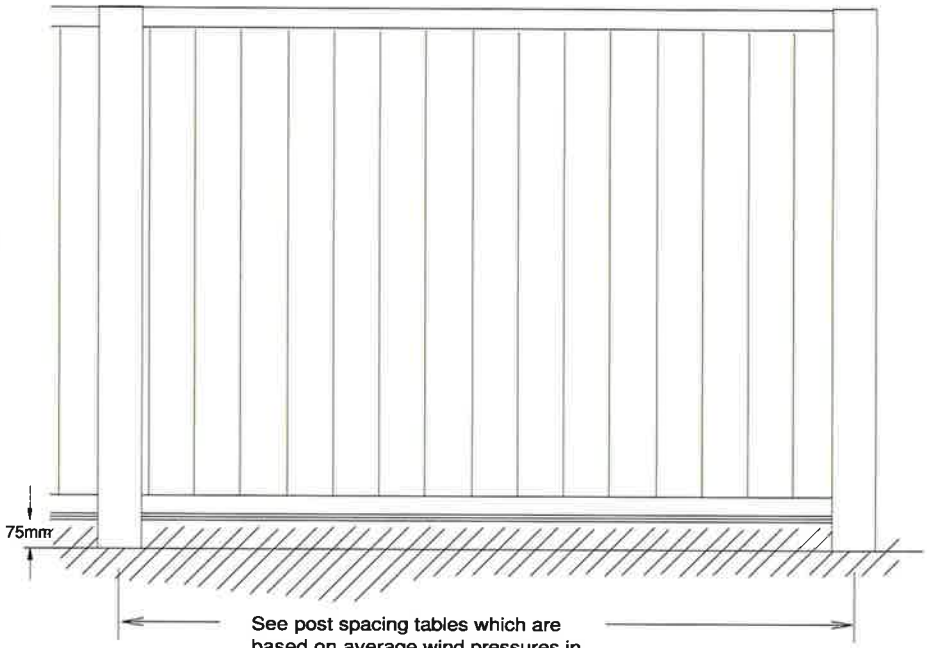
Alcuf Extruded Panel (AEP) provides a continuous sound seal with locked panels. AEP provide an STC rating of 20, and requires a 1.5" rail infill opening.

Rail sizes and dimentions are found on 608271-B. Infill openings range as follows;

1.5", 1.75", 2" and 2.125".

2-10M closed circular ties @ 75mm o/c @ top of pier, when 400mm base used.

Side View



See post spacing tables which are based on average wind pressures in your region on drawing 608271-G.

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

This drawing set consists of parts A to G.

FENCE HEIGHT (mm)	POST DEPTH IN FOOTING (mm)	TOP OF FOOTING (mm)	FOOTING DEPTH (mm)
"A" 1800 (6'-0")	"B" 750	"C" 1500	"D" 1800
"A" 2400 (8'-0")	"B" 800	"C" 1500	"D" 1800
"A" 3048 (10'-0")	"B" 800	"C" 1500	"D" 1800

NOTES:

Concrete strength @ 28 days: F'c=32 MPa - Class C2
Exposure 6% +/-1% Air Entrainment.
Reinforcing Steel: G30.18M - Grade 400

* Footing dimensions shown are a minumum typical size for optimum Eastern Canadian soil conditions.
* Consult the Geotechnical Engineer for your specific site for confirmation of our minimum design above, or alternate foundation design.

Alcuf DP2 Noise Barrier

DATE: 2022-06-10

DRAWING NUMBER: 608271-A

REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

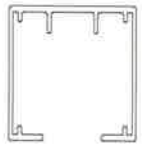
DRAWN BY:
designs@alcuf.com

Project Details:

DP2 Frameworks and Infill Options (up to 12' high)

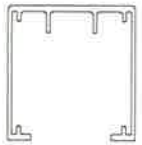
This drawing set consists of parts A to G.

END VIEW

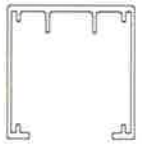


#1415 Rail for 1 1/2" infill

#1417 Rail for 1 3/4" infill



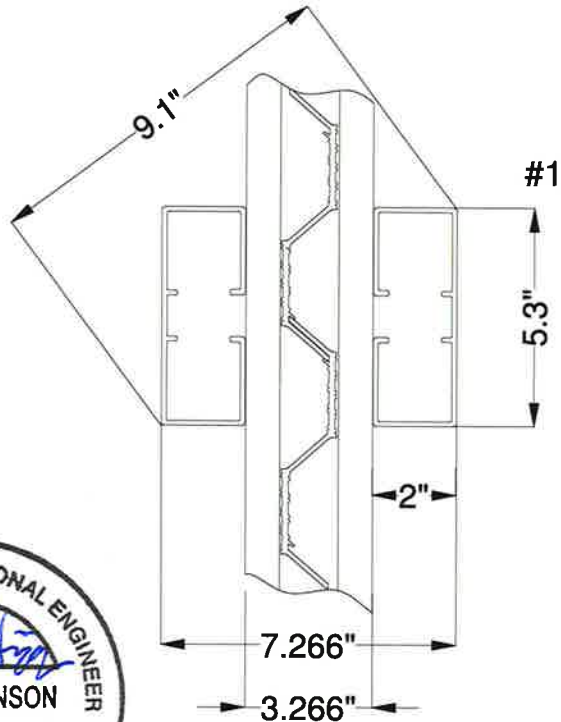
#1420 Rail for 2" infill



#1422 Rail for 2 1/8" infill

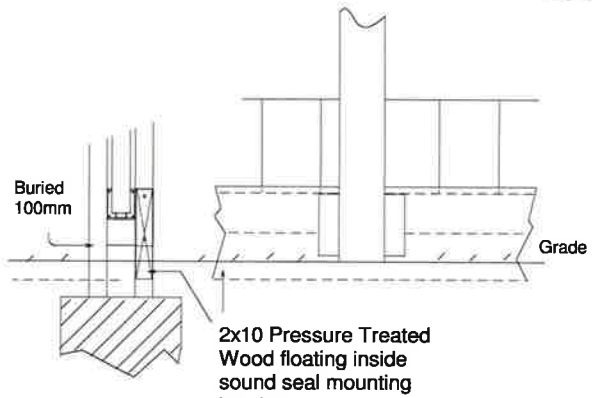
TOP VIEW

Shown: #1415 Rail with 1.5" #8100 STC 20 AEP (Aluminum Extruded Panel)



#1950 Post for #1400 series rails

Optional Sound Seal



The OPTIONAL SOUND SEAL is used between posts and to the side of the bottom rail, where a 2x8 or 10 board is attached in such a way that it is free to float with ground movement without adding stress to the bottom rail. This does not interfere with the adjustable elevation of the bottom rail. The average grade is typically filled to meet the Sound Seal. The Sound Seal board in this case is considered a sacrificial element that can be easily and economically replaced. However, this method is the most practical way to provide an effective sound seal between the earth, and the noise barrier.

Infill Options

Infill can range in scope from wood, to composite panels, to high strength extruded 6005 aluminum alloy panel, our premium infill.

Wood: For minimum maintenance using wood, it is best to leave it unstained. This provides a naturally weathered (and dry) wood infill, in a modern looking framework. Wood should have a moisture content of 19% or less. See Drawings 1910251 and 2206101 for more detail.

Another option is "Pressure Treated Kiln Dried wood". This is the most practical way to add colour to your wood, without the need to constantly restain. By Kiln Drying the wood first, you achieve a greater penentration from the Pressure Treatment. This is an important step to making Pressure Treating effective.

The Alcuf Extruded Panel (AEP): The Alcuf Extruded Panels are available in virtually any colour. These are extruded like the post and rails and other aluminum elements in the system. Because the AEP is extruded, it is extremely strong and very resistant to dents.

Stock framework colour is Black, other colours are available.

Alcuf DP2 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 608271-B
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP2 Connections and Assembly Details

This drawing set consists of parts A to G.

Figure 1 End View of assembled post with rails in place ready for infill.

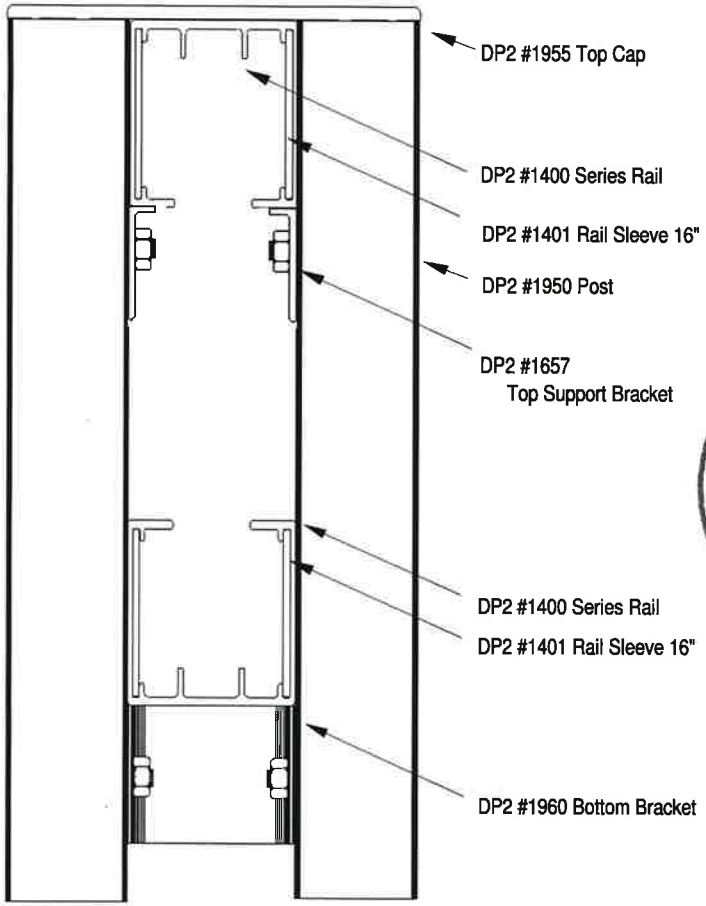


Figure 2 End View of assembled post ready to set in concrete

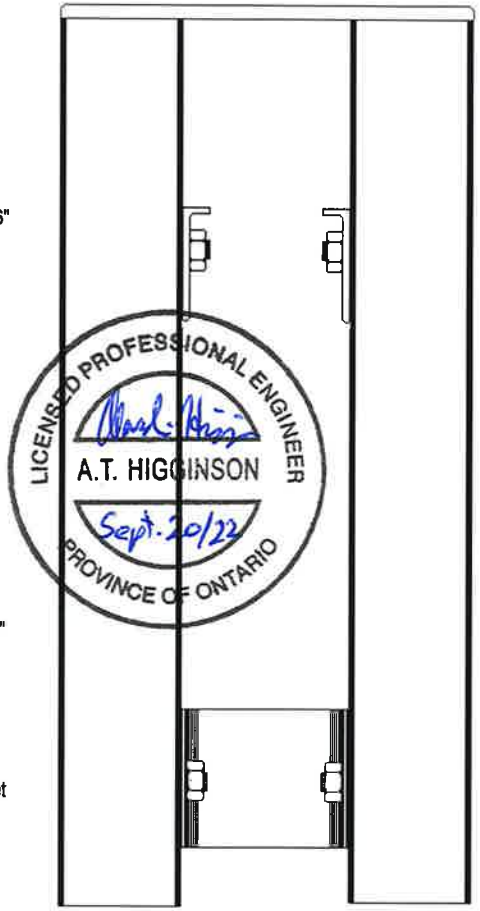


Figure 3 Post Cap slides down into top of posts

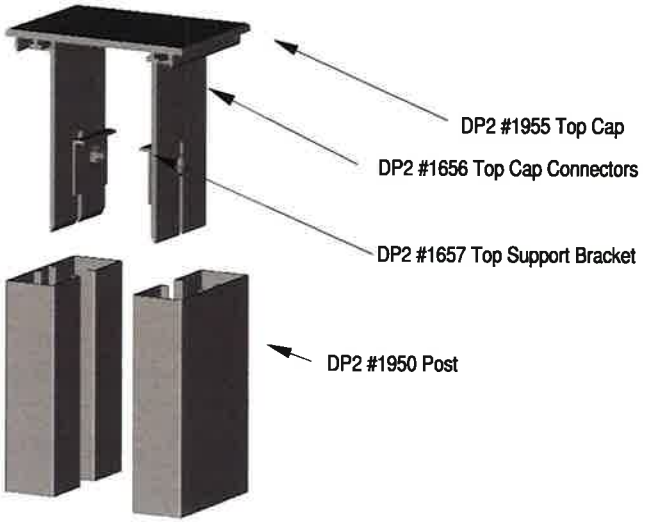
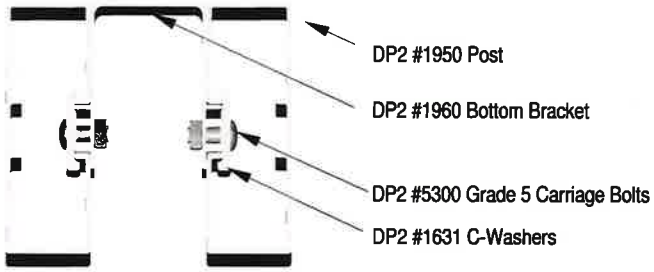


Figure 4 Top view of posts connected with Bottom Bracket



In Figure 1 we see an end view of the basic framework. Posts are assembled using the Post Cap shown in Figure 3, and the Bottom Bracket shown in Figure 4. Top Caps and Bottom Brackets are secured in place using grade 5 bolts and brackets shown in Figure 4. In Figure 4 we can see the Bottom Bracket in a top down view. Both the Bottom Bracket and the Post Cap insure that the two pieces are assembled at the right distance apart for setting in concrete, and then receiving top and bottom rails.

In Figure 2 we show an end view of the post assembly. Posts are assembled before they are set in concrete. Once set, the top cap is removed, and rails are mounted. Once the top cap is replaced and secured in place, you're ready to insert infill.

All nuts and bolts are 5/16" Grade 5 Carriage Bolts with a YELLOW ZINC RICH CHROMATE coating ASTM B-117.

Alcuf DP2 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 608271-C
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP2 Other Rail Connections

This drawing set consists of parts A to G.

Figure 1

Figure 2

Figure 3

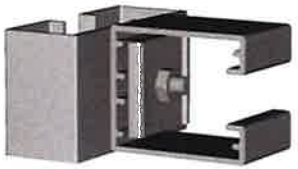


Figure 4

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

Connections: 2 way

3 way

4 way

4 way on an angle

3 Way Connections and 4 Way Connections are easy. Brackets of the same high strength 6005 alloy can be cut from various reused waste shapes providing secure mounting points for rails to connect to the side of posts (F1 and F2). The Post and Rails both have two fins right at the point where a hole can be drilled, reinforcing the shape walls avoiding weakness which would result otherwise (F4). The bolt head would reside inside the Post where it will not interfere with the Post Cap, and the nut would be supported by a C-Washer inside the rail (F3).

Note these brackets can be mitred for angle connections.

Alcuf DP2 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 608271-D
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP2 Sleeve Details and Expansion Gap Table

This drawing set consists of parts A to G.

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A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

Expansion Gap Table

Installation Temperature		
Celsius	Fahrenheit	Gap in inches (for 20' rails)
-20	-5	3/8
-15	0	3/8
-10	10	5/16
-5	20	5/16
0	30	1/4
5	40	1/4
10	50	1/4
15	60	3/16
20	70	3/16
25	80	3/16
30	90	1/8
35	100	1/8

Sleeve location and Rail Expansion

Rail sleeves must be no more than 12 inches from a post. The slip-fit between one half of the sleeve and the adjoining rail allows for the expansion and contraction that will occur. This is why the sleeve is fastened (riveted) to only one rail, and not both. The sleeve connection also provides an additional drainage point.

It is important to leave an expansion gap at each sleeve connection, to allow for expansion and contraction of the framework at different temperatures of the year. The Expansion Gap Table provides the Gap required depending on the temperature at the time of installation.

Alcuf DP2 Noise Barrier

DATE: 2022-06-10

DRAWING NUMBER: 608271-E

REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY: designs@alcuf.com

DP2 Post Finishing

This drawing set consists of parts A to G.

Post Edge Caps are used at Terminal Posts to terminate and retain the continuous flow of Infill.

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

Alcuf DP2 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 608271-F
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP2 Post Spacing Table

This drawing set consists of parts A to G.

Location	Hourly Wind Pressure (kPa)	Design Wind Pressure (kPa)	DP2 Series Minimum Rail/Post	7'=2.13m Meter	7'=2.13m Feet	8'=2.44m Meter	8'=2.44m Feet	10'=3.05m Meter	10'=3.05m Feet	12'=3.66m Meter	12'=3.66m Feet
Calgary	0.48	1.57	1400/1950	3.05	10	3.05	10	2.90	9.5	1.98	6.5
Edmonton	0.45	1.47	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7
Halifax (Region)	0.58	1.9	1400/1950	3.05	10	3.05	10	2.44	8	1.68	5.5
Montreal (Region)	0.42	1.38	1400/1950	3.05	10	3.05	10	3.048	10	2.286	7.5
Ottawa (Metropolitan)	0.41	1.34	1400/1950	3.05	10	3.05	10	3.05	10	2.29	7.5
Quebec city (region)	0.41	1.34	1400/1950	3.05	10	3.05	10	3.05	10	2.29	7.5
Saskatoon	0.43	1.41	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7
Toronto (Metropolitan)	0.44	1.44	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7
Toronto (Scarborough)	0.47	1.54	1400/1950	3.05	10	3.05	10	2.90	9.5	1.98	6.5
Vancouver (Burnaby)	0.47	1.54	1400/1950	3.05	10	3.05	10	2.90	9.5	1.98	6.5
Vancouver (Cloverdale, Haney, Langley, New Westminster, Surrey)	0.44	1.44	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7
Vancouver (Ladner)	0.46	1.51	1400/1950	3.05	10	3.05	10	2.90	9.5	1.98	6.5
Vancouver (North Vancouver, Richmond, City Hall, Granville & 41 ave)	0.45	1.47	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7
Vancouver (West Vancouver)	0.48	1.57	1400/1950	3.05	10	3.05	10	2.90	9.5	1.98	6.5
Winnipeg	0.45	1.47	1400/1950	3.05	10	3.05	10	3.05	10	2.13	7

Note: For more post spacing detail, consult our provincial charts. These are available on request from design@alcuf.com.

If you know the kPa Hourly Wind Presure value in a specifc area, we can tell you what the post spacing should be for DP1, 2, or 3 anywhere in Canada.

1. Hourly average wind pressure, in kPa are listed in the supplement to the National Building Code of Canada (2015) Climatic Information for building design in Canada, using the hourly wind pressure 1/50.
2. Fence infill material has been assumed to have a max surface density of 24 kg/m^2 and 100% solid coverage.
3. The design wind pressure are calculated using a load factor of 1.4, a gust effect factor of 2.5, a open terrain exposure factor of 0.9, a force coefficient of 1.3, and an importance factor of 0.8.
4. Post and rail sections are extruded Aluminum shapes using alloy 6005, with a minimum yield strength of 240 MPa.
5. Post (DP1 1650 series) and Rail (DP1 1100 series) sections checked for strength in accordance with S157-05/S157.1-05 (reaffirmed 2015), Strength design in Aluminum.
6. Structural Engineering by: Alasdair Higginson P.Eng, ahigginson@blp.ca
7. Reference: https://nrc-publications.canada.ca/eng/view/object/?id=c8876272-9028-4358-9b42-6974ba258d99

BUCHAN, LAWTON, PARENT LTD
Consulting Engineers
5-5370 Canotek Road, Ottawa, Ontario K1J 9E6
www.blp.ca

Alcuf DP2 Noise Barrier

DATE: 2022-06-10

DRAWING NUMBER: 608271-G

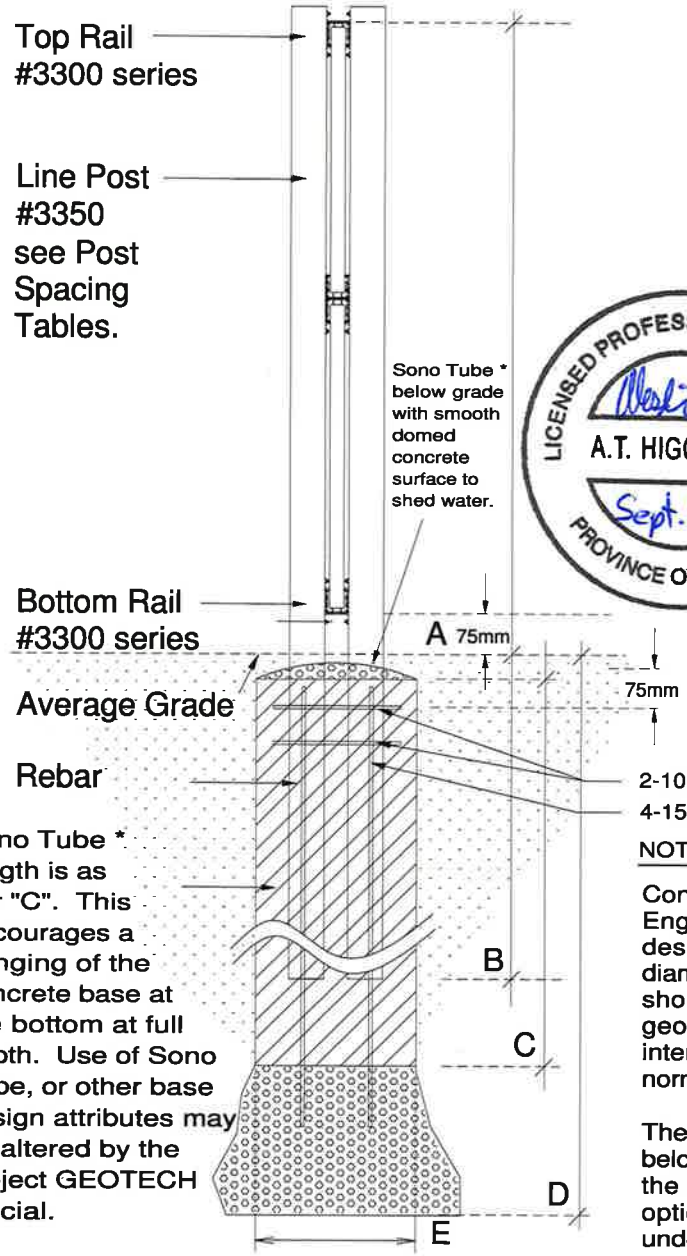
REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

End View



Note: Minimum (C) Depth is 75% of (D).
Minimum (D) Depth is 50% of fence height,
Minimum (E) Diameter is 24".

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 29/22
PROVINCE OF ONTARIO

Side View

See post spacing notes on drawing 812061-C.

2-10mm closed circular tie o/c. One at approx. 75mm depth at top of pier, the other .75mm below that.
4-15mm vertical rebar from inside circular tie at approx. 50mm depth at top of pier.

NOTES:

Consult the project Geotechnical * Engineer for site specific foundation design. The base design, depth and diameter requirements A B C D and E should be designed based on the geotechnical site reports. This is intended to show a typical base for normal conditions.

There are to be no continuous gaps below the barrier except with approval by the Acoustic Consultant. There are optional sound seals that can seal gaps under the barrier when required.

Typical post depth (B) into base is 5' when height is 16' or under, and 6' between heights of 16.5' and 20'.

Typical Concrete strength @ 28 days: F'c=32 MPa - Class C2 Exposure 6% +/-1% Air Entrainment.
Reinforcing Steel: G30.18M - Grade 400.

This drawing set consists of parts A to E.

Alcuf DP3 Noise Barrier

DATE: 2022-08-02

DRAWING NUMBER: 812061-A

REV: 3.1

SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

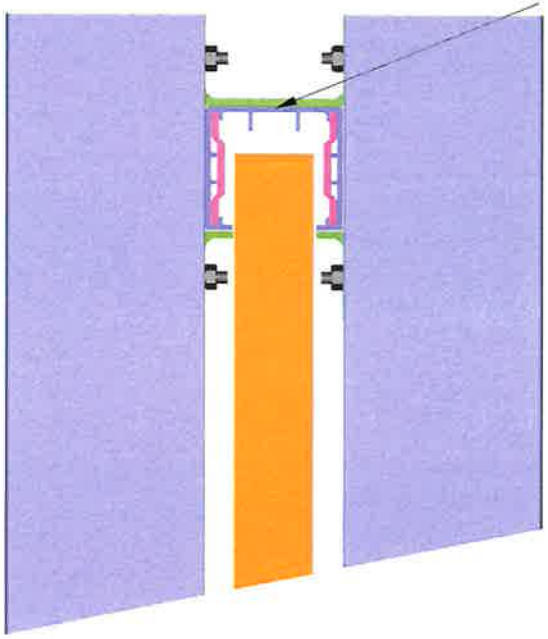
DRAWN BY:
designs@alcuf.com

Project Details:

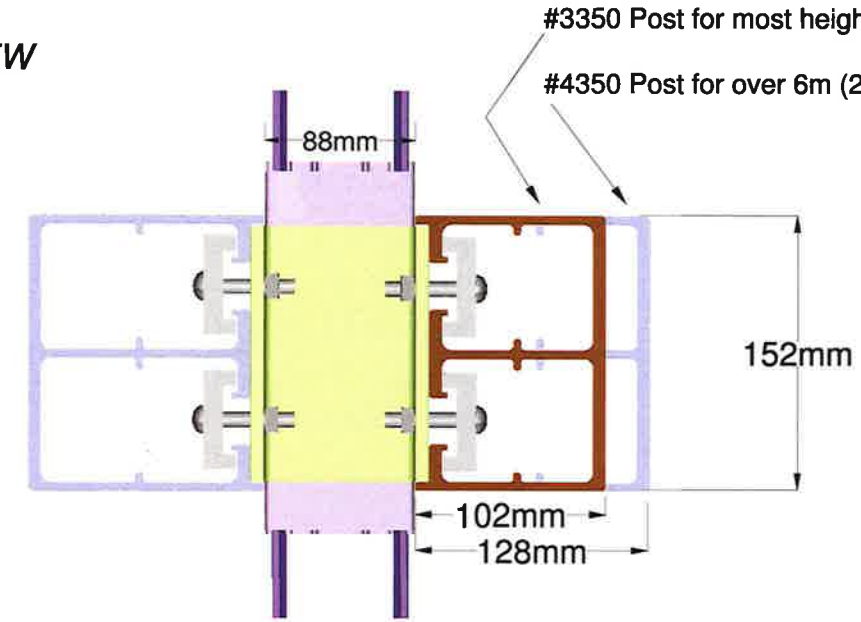
DP3 Frameworks and Infill Options up to 20' (6.2m) high

This drawing set consists of parts A to E.

END VIEW



TOP VIEW



Rail Options

Various rail sizes are available to accomodate your project, depending on your infill selection and your noise reduction requirements.

Infill Options

Noise Barrier Infill can range in scope from wood, to composite panels, to high strength extruded aluminum alloy panels depending on your STC requirements.

To date, wood has been the most common material used in our sound barrier fences. It offers a very reasonably priced alternative. To be effective, the wood must be stable and dried to a moisture content less than 19%. Our large tongue and groove specification, allows wood to move without presenting any gaps. This, along with our carefully designed aluminum rails, insures that the material is protected on the top and dries out quickly in other areas, delivering 20-30 years of excellent noise reduction performance after which time the infill can be replaced easily and economically.

Our high strength extruded 6005-T5 aluminum alloy panels provide an even longer lasting, highly durable alternative. These self-locking panels will provide a secure and continuous sound seal for 50+ years

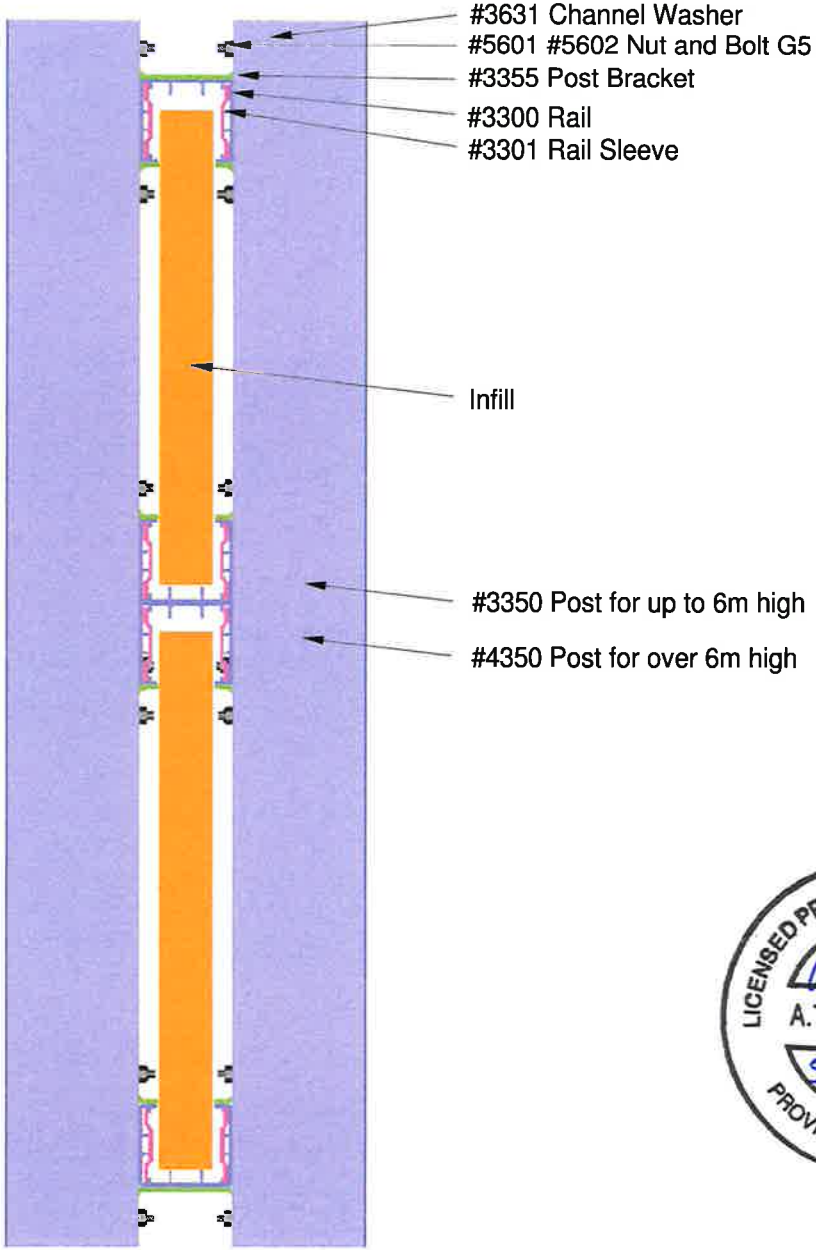
Alcuf DP3 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 812061-B
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP3 Connections and Assembly Details

This drawing set consists of parts A to E.

Figure 1.



All nuts and bolts are 1/2" Grade 5 with a YELLOWTRICHCHROMATE coating ASTM B-117.

DP3 Post Spacing

Post spacing will be calculated based on fence height, location, infill, exposure, and the average wind pressures in your region. **Please refer to our provincial post spacing tables** to calculate the appropriate post spacing for your project.

Depending on the type of infill, and the height of the Noise Barrier, you may need to put in a center rail to support the infill and distribute the infill loading on the framework.

1. Hourly average wind pressure, in kPa are listed in the supplement to the National Building Code of Canada (2015) Climatic Information for building design in Canada, using the hourly wind pressure 1/50.

2. Fence cover material has been assumed to be 2 1/8" wood panel, 100% solid infill.

3. The design wind pressures are calculated using a load factor of 1.4, a gust effect factor of 2.5, an open terrain exposure factor of 0.9, a force coefficient of 1.3, and an importance factor of 0.8.

4. Post and rail sections are extruded Aluminum shapes using alloy 6005, with a minimum yield strength of 240 MPa.

5. Post (DP3 3350/4450 series) and Rail (DP3 3300 series) sections checked for strength in accordance with S157-05/S157.1-05 (reaffirmed 2015), Strength design in Aluminum.

6. Structural Engineering for the Alcuf Double Post Fence System (DP3) was performed by Buchan, Lawton, Parent Ltd, Ottawa, Ontario, Canada (blp.ca).

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

Alcuf DP3 Noise Barrier

DATE: 2022-06-10		DRAWING NUMBER: 812061-C
REV: 3.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

DP3 Sleeve Details and Expansion Gap Table

This drawing set consists of parts A to E.

Expansion Gap Table

Installation Temperature		
		Gap in inches
Celsius	Fahrenheit	(for 20' rails)
-20	-5	3/8
-15	0	3/8
-10	10	5/16
-5	20	5/16
0	30	1/4
5	40	1/4
10	50	1/4
15	60	3/16
20	70	3/16
25	80	3/16
30	90	1/8
35	100	1/8

Sleeve location and Rail Expansion

Rail sleeves must be no more than 12 inches from a post. The slip-fit between one half of the sleeve and the adjoining rail allows for the expansion and contraction that will occur. This is why the sleeve is fastened (riveted) to only one rail, and not both. The sleeve connection also provides an additional drainage point.

It is important to leave an expansion gap at each sleeve connection, to allow for expansion and contraction of the framework at different temperatures of the year. The Expansion Gap Table provides the Gap required depending on the temperature at the time of installation.

Alcuf DP3 Noise Barrier

DATE: 2022-06-10

REV: 3.1

SCALE: none

DRAWING NUMBER:

812061-D

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

Notes

Mounting on concrete surfaces:

When attaching to solid concrete surfaces, core drilling, or in the case of new construction, casting a cavity large enough to grout posts in place with a non expanding grout, is the best solution. If the surface does not allow for cavities of an appropriate size, ie on bridges, or where prestressed concrete may be used, it is possible to use mounting brackets.

Mounting brackets are typically designed to accommodate each application. This requires data on the surface being attached to including the concrete specification, the construction technique ie poured, prestressed, dimensions, etc. Each case is designed by our structural engineers to insure a solid footing.

Noise reduction performance:

Alcuf is a proven framework that can accommodate many different types of infill. Depending on your project requirements, a suitable infill will be recommended.

We have infills in wood that historically can deliver noise reduction for 25 - 30 years. The advantage of our framework is the wood remains dry and is free to expand and contract (with the weather) without working itself loose, or presenting gaps. Wood is beautiful and a renewable resource that is our most common infill.

We have infills in extruded aluminum, that are the longest lasting, and will in fact last as long as our framework. We have 40+ year old systems with frameworks as good as new. We have systems with extruded panels that are now 35+ years old and as good as new from both a noise reduction performance and structural performance perspective. There is no reason not to interpolate a life span of over 50 years based on actual performance.

ENGINEERING BY:

BUCHAN, LAWTON, PARENT LTD
Consulting Engineers
5-5370 Canotek Road, Ottawa, Ontario K1J 9E6
www.blp.ca

LICENSED PROFESSIONAL ENGINEER
A.T. HIGGINSON
Sept. 20/22
PROVINCE OF ONTARIO

Alcuf DP3 Noise Barrier

DATE: 2022-06-10

DRAWING NUMBER: 812061-E

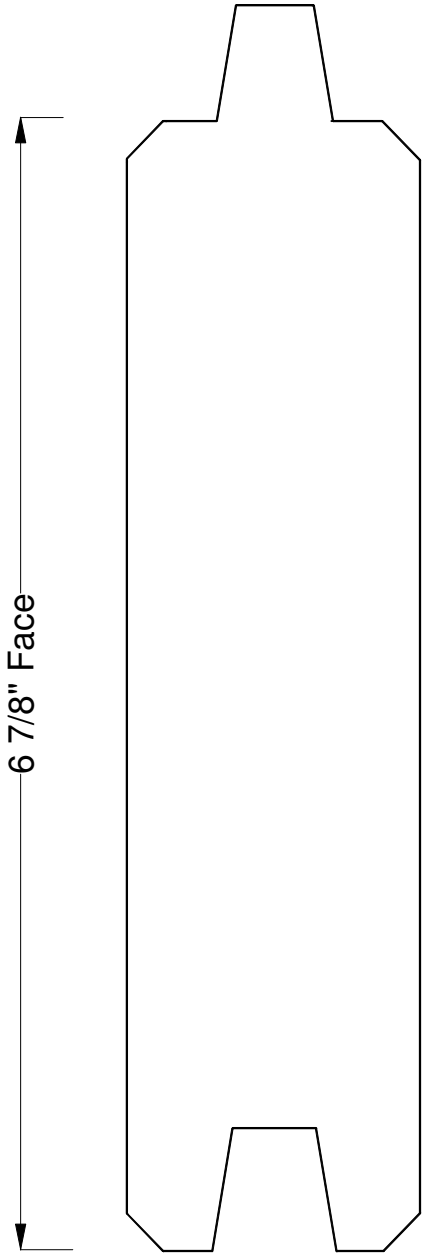
REV: 3.1

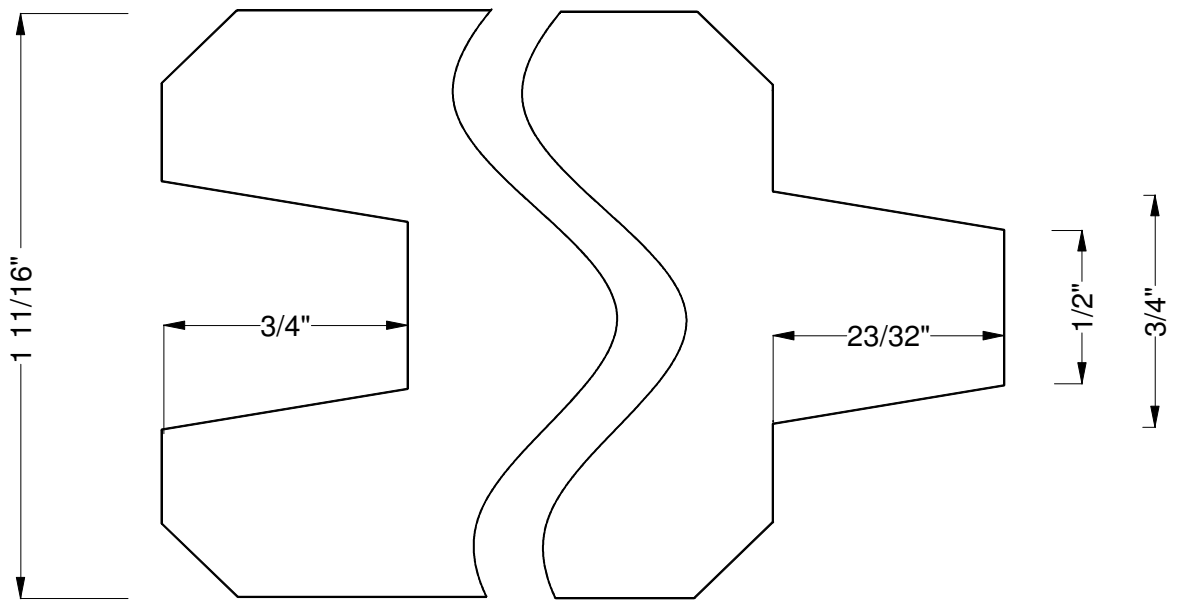
SCALE: none

Alcuf International Inc.
Ottawa, Ontario, Canada
www.alcuf.com

DRAWN BY:
designs@alcuf.com

For standard Alcuf DP2 3.26" Rails with a 1.75" opening.





Douglas Fir infill boards shall meet or exceed the NLGA grading rules for No.1 Structural as per paragraph 124b (Under Struct Light Framing/Joists & Planks – 2"-4" thick), graded as such from both faces. There shall be no prior selection, have tight knots with no through holes and boards must be free of heart center. Material must be air dried or Kiln dried to 19% or less. Minimum STC rating of 20.

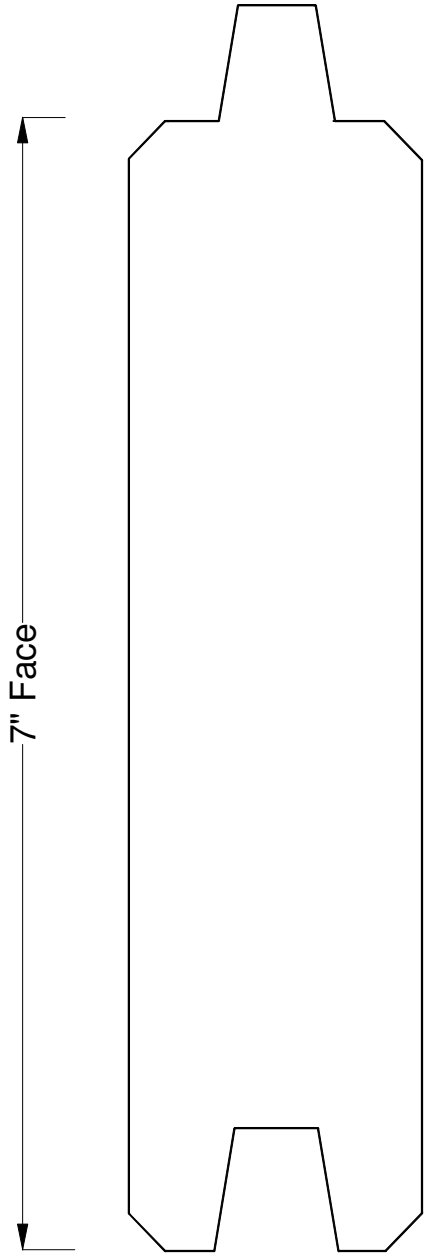
OPTIONAL: PRESSURE TREATING
Preservative is Micronized Copper Azole (MCA). Preservation Retention is 0.04 pounds per cubic foot. Colour is Red-brown. Wood must be dried to 19% moisture content or less after pressure treating.

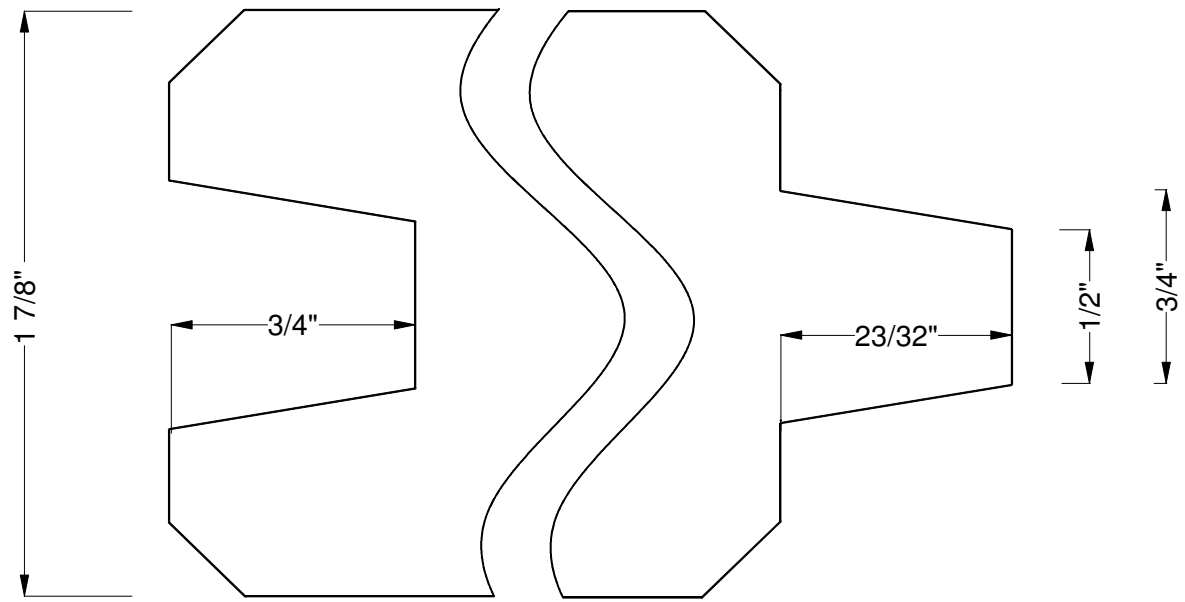
This board is fully dressed.

Surface density of 24 kg/m² (=4.9 lb/ft²) (source SSWA INC., Richmond Hill, Ontario, 2022).

Alcuf Noise Barrier V-Joint Douglas Fir TG		
DATE: 2022-06-10		DRAWING NUMBER: 2206101
REV: 2.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

For standard Alcuf DP2 3.26" Rails with a 2" opening.





White Pine Infill Board shall meet or exceed the NLGA grading rules for three (3) Common and better as per paragraphs 118a, b & c, NPS (no prior selection), No Holes, Kiln Dried or Air Dried 19% or less, graded as such from both faces. Minimum STC rating of "20".

OPTIONAL: PRESSURE TREATING Preservative is Micronized Copper Azole (MCA). Preservation Retention is 0.04 pounds per cubic foot. Colour is Red-brown. Wood must be dried to 19% moisture content or less after pressure treating.

This board is saw cut, then band cut.

Surface density of 20 kg/m^2 (=4.0 lb/ft^2) (source SSWA INC., Richmond Hill, Ontario, 1979).

Alcuf Noise Barrier V-Joint White Pine TG		
DATE: 2022-06-10		DRAWING NUMBER: 1910251
REV: 2.1	SCALE: none	
Alcuf International Inc. Ottawa, Ontario, Canada www.alcuf.com		DRAWN BY: designs@alcuf.com

SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA22-006

ACOUSTIC REVIEW AND TESTING OF DOUGLAS FIR WOOD FOR USE AS SOUND BARRIER WALLS IN ONTARIO

SUBMITTED TO:

MR. HARVEY PARISIEN, PRESIDENT
ALCUF INTERNATIONAL INC.,
6178 MITCH OWENS RD,
OTTAWA, ON, K4M 1B2

PREPARED BY:

OMAR RAHAL, B.ENG, EIT
ACOUSTIC ANALYST

HAZEM GIDAMY, M.ENG, P.ENG.
PRINCIPAL

APRIL 8, 2022

ACOUSTIC REVIEW AND TESTING OF DOUGLAS FIR WOOD FOR USE AS SOUND BARRIER WALLS IN ONTARIO

INDEX PAGE

1.0 INTRODUCTION

The services of SS Wilson Associates (SSWA) have been retained by Alcuf International Inc. to review and examine some aspects related to the acoustic properties of Douglas Fir wood species for potential use as sound barrier walls, sometimes referred to as acoustic fences.

In the course of our examination and review, SSWA has undertaken a density testing programme of several samples of the Douglas-Fir, including examining the published data and reference documents on this wood species, and to also advise on its acceptability with respect to meeting the Ministry of the Environment, Conservation and Parks (MECP) surface density requirement of use as sound barriers in new residential development applications.

2.0 BACKGROUND

The most widely used wood species for construction of sound barrier walls in Ontario in connection with new residential developments are SPF (spruce-pine-fir), western red cedar, various species of pressure-treated wood, jack pine, and others. These wood species have different material characteristics and cost preference for use in Ontario depending on the application and scope of the project.

Acoustically, there is one overriding factor as far as the wood species are concerned in that sound barriers are required to meet a specific density, expressed as “surface density”. This density is required to reduce the sound energy transmitted directly through the wood product itself to be less than the acoustic energy diffracted over the top of the barrier by at least 10 decibels (10 dB). To achieve this objective, including a small margin of safety, the MECP requires all permanent sound barrier walls to meet a minimum surface density of 20 kg/m^2 (or 4 lb/sq.ft.).

With the growing need for the use of natural wood species that are naturally resistant to the exterior weather elements and decay, Alcuf International Inc. expressed their interest in promoting the use of Douglas-Fir as a more attractive alternative to other wood species in regards to its desirable properties as reported in this document.

3.0 REVIEW OF OTHER REFERENCE MATERIAL (VOLUNTARY INFORMATION)

Douglas-Fir (*Pseudotsuga Menziesii*) is a wood species found in British Colombia, along its coastal region, and in BC’s Interior. It is a large-sized tree that grows up to 42 meters high in the Interior, and up to 85 meters high on the coast. Douglas Fir is considered a “softwood species”. Known for its strength, Douglas Fir is typically used for construction and buildings.[1]

1 https://www.naturallywood.com/species/douglas-fir/

As to the important tasks of being able to be machined, Douglas Fir wood showed good planing results, as well as excellent scores in the shaping tests of Douglas Fir as well as high surface quality in its turning tests.

As to one of the important aspects of a sound barrier, which is shrinkage, information published indicates that Douglas Fir has favorable shrinkage characteristics for its density.

4.0 MECP SURFACE DENSITY CRITERIA FOR SOUND BARRIERS

To be effective, the MECP specifies that sound barriers have several qualities and specifications including the following:

- The barriers must be solid, free from gaps or holes and have adequate surface mass density, not less than 20 kg/m^2 (4 lb/ft^2)
- The barrier should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without through cracks or surface gaps between panels.

5.0 RESULTS OF THE SURFACE DENSITY TESTING OF DOUGLAS FIR

Several dressed samples of Douglas Fir have been provided by Alcuf International Inc., which were then cut to produce the following actual dimensions: 1-½" x 4-½" x 1", 1-½" x 4-¼" x 1", 1-½" x 4-¼" x 1-½", 1-½" x 4-½" x 1-½".

A total number of eight (8) test specimens have been tested in our laboratory by firstly keeping the samples in a relatively dry office environment, under constant temperature of 23°C and more or less constant humidity conditions. The desired moisture content of the wood samples' is 6-8 % as measured immediately prior to testing, which is considerably below the outside environment, to be on the conservative side. The potential error in the sample weight is approximately 0.003% and the overall error of the testing is expected to be a maximum of ±3%.

The following summarize the results of the tested samples:

- Average humidity contents of the wood 7.5% (+/ 1%)
- Average measured density: 945 kg/m^3
- Calculated surface density[2]: 24 kg/m^2 (=4.9 lb/ft^2)
- Based on the foregoing results and in order to meet the MECP surface density criteria for sound barriers, a flat board having an **actual** thickness of 1" can produce a surface density of approximately 24 kg/m^2 (equal to approximately 4.9 lb/ft^2). Further edge chamfering will reduce the surface density, depending on the edge treatment design.

2 Per 1" thick actual sample.

6.0 CONCLUSIONS

In order to meet the MECP surface density requirements of 20 kg/m^2 (4 lb/ft^2), a minimum **actual** board thickness (or the combined thickness of 2 boards) of 1" of the tested Douglas Fir would be required, without taking into effect chamfering of the edges and without machining the boards to include special connections such as T&G, shiplap, etc. It must be noted that this actual thickness only takes into consideration the acoustic properties of the Douglas Fir, and not the structural characteristics. In actuality, one would require more than 1" of thickness for increased rigidity to suit the environment in Ontario.

Based on our testing and the information reviewed in connection with Douglas Fir, it is our opinion that this wood species would make an excellent product for sound barriers.

This report does not address other characteristics of the tested wood samples reported as reference material in this document.

Alcuf International Inc., Ottawa, Ontario, Canada

Structural Engineering by: Alasdair Higginson P.Eng, ahigginson@blp.ca

Annual Hourly Wind Pressure (AHWP) 1/50, kPa as per Ontario Building Code SB-1

OBC dated 2014, effective 2015, with amendments effective 2017

This table is effective: May 18, 2022

DP1, 2, and 3 Frameworks
Post Spacing Calculations
ONTARIO CANADA
Assuming 100% infill coverage

	DP1			DP2				DP3			
	Height (ft)										
	5	6	7	7	8	10	12	14	16	18	20
	Height (m)										
	1.524	1.829	2.134	2.134	3.048	3.048	3.658	4.267	4.877	5.486	6.096
Location	**AHWP 1/50**	**Spacing (ft)**										
Ailsa Craig	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Ajax	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Alexandria	0.40	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Alliston	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Almonte	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Armstrong	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Arnprior	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Atikokan	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Attawapiskat	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Aurora	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Bancroft	0.32	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0
Barrie	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Barriefield	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Beaverton	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Belleville	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Belmont	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Big Trout Lake	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
CFB Borden	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Bracebridge	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Bradford	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Brampton	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Brantford	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Brighton	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Brockville	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Burk's Falls	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Burlington	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Cambridge	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Campbellford	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Cannington	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Carleton Place	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Cavan	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Centralia	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Chapleau	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Chatham	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5

Chesley	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Clinton	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Cobocok	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Cobourg	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Cochrane	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Colborne	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Collingwood	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Cornwall	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Corunna	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Deep River	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Deseronto	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Dorchester	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Dorion	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Dresden	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Dryden	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Dundalk	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Dunnville	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Durham	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Dutton	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Earlton	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Edison	0.31	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Elliot Lake	0.38	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Elmvale	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Embro	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Englehart	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Espanola	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Exeter	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Fenelon Falls	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Fergus	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Forest	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Fort Erie	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Fort Erie Ridgeway	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Fort Frances	0.31	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Gananoque	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Geraldton	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Glencoe	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Goderich	0.55	10.0	8.0	6.0	10.0	10.0	8.0	5.5	10.0	10.0	8.0	6.5
Gore Bay	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Graham	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Gravenhurst	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Grimsby	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Guelph	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Guthrie	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Halleybury	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Haldimand Caledonia	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Haldimand Hagersville	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Haliburton	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Halton Hills	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Hamilton	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Hanover	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Hastings	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Hawkesbury	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0

Hearst	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Honey Harbour	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Hornepayne	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Huntsville	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Ingersoll	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Iroquois Falls	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Jellicoe	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Kapuskasing	0.31	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Kemptville	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Kenora	0.31	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Killaloe	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Kincardine	0.55	10.0	8.0	6.0	10.0	10.0	8.0	5.5	10.0	10.0	8.0	6.5
Kingston	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Kinmount	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Kirkland Lake	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Kitchener	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Lakefield	0.38	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Lansdowne House	0.32	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0
Leamington	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Lindsay	0.38	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Lion's Head	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Listowel	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
London	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Lucan	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Maitland	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Markdale	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Markham	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Martin	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Matheson	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Mattawa	0.32	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0
Midland	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Milton	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Milverton	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Minden	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Mississauga	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Port Credit	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Mitchell	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Moosonee	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Morrisburg	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Mount Forest	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Nakina	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Nanticoke	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Napanee	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
New Liskeard	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
Newcastle	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Bowmanville	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Newmarket	0.38	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Niagara Falls	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
North Bay	0.34	10.0	10.0	9.5	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Norwood	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Oakville	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Orangeville	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0

Orillia	0.36	10.0	10.0	9.0	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Oshawa	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Ottawa	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Owen Sound	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Pagwa River	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Paris	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Parkhill	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Parry Sound	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Pelham (Fonthill)	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Pembroke	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Penetanguishene	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Perth	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Petawawa	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Peterborough	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Petrolia	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Pickering	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Picton	0.49	10.0	9.0	6.5	10.0	10.0	9.0	6.5	10.0	10.0	9.0	7.5
Plattsville	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Point Alexander	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Port Burwell	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Port Colborne	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Port Elgin	0.55	10.0	8.0	6.0	10.0	10.0	8.0	5.5	10.0	10.0	8.0	6.5
Port Hope	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Port Perry	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Port Stanley	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Prescott	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Princeton	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Raith	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Rayside-Balfour	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Red Lake	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Renfrew	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Richmond Hill	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Rockland	0.40	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Sarnia	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Sault Ste. Marie	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Schreiber	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Seaforth	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Shelburne	0.40	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Simcoe	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Sioux Lookout	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Smiths Falls	0.41	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Smithville	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Smooth Rock Falls	0.32	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0	10.0	10.0	10.0
South River	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Southhampton	0.53	10.0	8.5	6.0	10.0	10.0	8.5	6.0	10.0	10.0	8.5	6.5
St. Catharines	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
St. Marys	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
St. Thomas	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Stirling	0.40	10.0	10.0	8.0	10.0	10.0	10.0	7.5	10.0	10.0	10.0	9.0
Stratford	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Strathroy	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Sturgeon Falls	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0

Sudbury	0.46	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	8.0
Sundridge	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Tavistock	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Temagami	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Thamesford	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Thedford	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Thunder Bay	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Tillsonburg	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Timmins	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Toronto	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Etobicoke	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
North York	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Scarborough	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Trenton	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Trout Creek	0.35	10.0	10.0	9.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
Uxbridge	0.42	10.0	10.0	7.5	10.0	10.0	10.0	7.5	10.0	10.0	10.0	8.5
Vaughan	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Vittoria	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Walkerton	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Wallaceburg	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Waterloo	0.37	10.0	10.0	8.5	10.0	10.0	10.0	8.5	10.0	10.0	10.0	10.0
Watford	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Wawa	0.39	10.0	10.0	8.5	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.5
Welland	0.43	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.5
West Lorne	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Whitby	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Whitby Brooklin	0.45	10.0	10.0	7.0	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
White River	0.30	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Wiarton	0.48	10.0	9.0	6.5	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Windsor	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5
Wingham	0.50	10.0	9.0	6.5	10.0	10.0	9.0	6.0	10.0	10.0	9.0	7.0
Woodstock	0.44	10.0	10.0	7.5	10.0	10.0	10.0	7.0	10.0	10.0	10.0	8.0
Wyoming	0.47	10.0	9.5	7.0	10.0	10.0	9.5	6.5	10.0	10.0	9.5	7.5

This table is effective: May 18, 2022

Areas of interest, no other significance	X
Areas designated windy areas, caution	X
Post spacing other than 10' o/c	X

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NOTE: 20' high is possible with the standard DP3 Post, but post spacings start to get closer together. We can produce DP system posts that can deliver 10' post spacing at 20' or more.

ENGINEERING BY:

BUCHAN, LAWTON, PARENT LTD
Consulting Engineers
5-5370 Canotek Road, Ottawa, Ontario K1J 9E6
www.blp.ca

ALCUF PRODUCTS DESIGN

1/9/2017

DESIGN POINTS AND LIFE CYCLE EXPECTATIONS

This document describes key design points inherent in the design of Alcuf Products and the resulting long term service you can expect.

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ALCUF PRODUCTS DESIGN

DESIGN POINTS AND LIFE CYCLE EXPECTATIONS

THE ALCUF ENVIRONMENT IS OUTDOORS

There are a number of design points that must be considered in order to understand the value of Alcuf Products, and how they manage to outperform all other products in their field.

Water

The design of your Alcuf System has carefully been thought out in order to avoid any significant collection of moisture that would cause damage. If water collects in the framework of any product outdoors, it may freeze and the resulting expansion can cause damage. The power of water turning to ice can break a very thick walled pipe. To avoid this, the majority of shapes used in Alcuf Systems are not hollow. In addition, the connection methods of these solid shapes are done in such a way as to allow for proper drainage flow.

Plastic posts are typically hollow, and will collect water and suffer from freezing. Once the components crack, the structural integrity starts to weaken.

Wood posts rot because the post is subjected to both water/moisture and bacteria at the same time, right at the ground surface. As a fence post decays it weakens. Because Alcuf structural components are aluminum, this issue is not relevant. Our posts will not rot, warp, or rust. Please read the section on Aluminum extrusions for more detail.

Our company is old enough to have seen Alcuf Fences still in service after 40 years. The framework which is Aluminum will have a very long lifetime. The Infill, when wood, will eventually shrink a bit and weaken and need replacement, but this is after 25 to 30 years in our experience. Our wood infill is typically inserted into our aluminum top and bottom rails and remains dry. No nails are used to rust and give moisture a place to collect, and the critical board edges (top and bottom) are protected in our framework. We have seen quality wood infill in Alcuf Fencing last over 35 years because it remains dry and there are no nails. This is unheard of using traditional designs. When necessary, replacement of the wood infill is a relatively quick and low cost endeavor.

Adjustability

Alcuf Fencing Systems are adjustable by design. The biggest threat to a fence post is the unknown. Posts are traditionally set in concrete, but you can't necessarily know exactly what exists under the ground nearby your post base. The fact is, the stability of the ground can be very unpredictable. particularly in the case of most residential developments, where the land at the property line is fresh fill. a. Hence, the careful design of a concrete base standard and the ability to adjust for changes in elevation is critical. It would be very rare to see an Alcuf post sink because of our base design, but if it did, a simple adjustment resolves the issue.

Aluminum - the ultimate building material

Aluminum Extrusions are of the most controllable man made substance available for structural design, and engineered products. Depending on where a component is used, how it is shaped, and how it is impacted by usage and other elements like weather, wind, etc., very precise choices can be made. You can select an alloy that is ridged, or very flexible, or extra tough, or very soft, all for the specific intended purpose. You can choose various coatings for the most durability in a high wear position, or proximity to chemicals or environmental issues that will affect performance. This is why Extruded Aluminum is used in the construction of Aircraft, Bridges, Boats, Medical equipment, Spacecraft, and anything where long life cycles, safety, precision and controlled performance are required.

Lightweight, Durable, Dependable Aluminum is the ultimate building material. The primary infrastructure (framework) is extremely strong, yet very light weight. This makes the overall safety and security of the system far superior to steel or timbers. Steel rusts and needs frequent repainting, and Wood deteriorates as a framework due to rot at critical points.

Extrusions are 100% recyclable, and remain 100% reusable. This cannot be said of any other structural material in this class. At any point during the life span of your Alcuf Product, the extruded aluminum can be recycled if a site has to be demolished, or it can be moved and reused. The value of the material is never lost. Your original material investment is retained more than any other building material. The result is your original investment delivers the highest return available, and Aluminum is never wasted or found in a land fill. At the time of writing, 75 percent of all aluminum produced since 1888 is still in use!

Alcuf Systems are inherently convertible as well. For example, if you want to change your railing from pickets to glass. You can increase the height of your railing and change the infill to wood inserts, or Aluminum Extruded panels for privacy. You can also change it back. This is all assuming your local building codes and/or bylaws allow such design changes, but the point is - it is possible.

Initial Installations and Future Work are achieved without the need of heavy equipment, heavy transport, or special handling requirements. This not only results in reduced initial Installation costs, but affects life cycle costs as future repair, expansion or maintenance remain minimized to the end user.

Expansion or Maintenance is minimized as there is no need to refinish the system, and any components that are damaged or eventually wear, are simple to remove and replace. Maintenance is typically limited to spray washing the system to keep it clean.

Built to suit varying site conditions. Alcuf is not prefabricated, it is designed to be assembled on site and adapt to varying sizes and shapes of buildings. This means reduced limits to its target markets, and inherent adaptability to varying building design and builder dimensions and practices. This flexibility makes future expandability or reconfiguration equally as flexible. Another future cost reduction when applicable.

Integrated Design. Alcuf Systems can be used for community perimeters, noise barriers, privacy, property dividers, traffic and access control systems, decks, balconies or railings, and Pavilions for garbage management, equipment storage or other. All systems can be integrated and look great together. For example, the framework and infill of a perimeter sound fence would have to be substantially heavier than internal fencing, or privacy panels on a Balcony, but in appearance and style, they will appear the same.

Structurally engineered to support the weight of a variety of infill ranging from Aluminum Extruded Panels (not roll formed), Wood, Glass, and other composites. Structurally engineered to support wind loading based

on your location in North America, your local building codes, the infill used, etc. Our structural designs can meet building codes, and bridge codes.

Predictable and Proven. Alcuf Systems performance is very predictable and proven. This is important for budgeting maintenance and support costs in a Condominium Corporation or in any environment where true life cycle cost matters and the owner is responsible for long term maintenance and upkeep costs. This also applies to safety and other performance points. Predictability and proven performance is what makes Alcuf Systems the least expensive solution in the long run, and what gives you the best value solution from day one.

75 percent of all aluminum produced since 1888 is still in use!

It is becoming increasingly necessary today for people to make better buy decisions to support long term sustainability, both in the commercial world and in their personal lives. This applies not only to the performance element of this issue, but also from an environmental perspective. Having to do repairs and/or replacements that could have been avoided if managed better, are both economically and environmentally unsound. Our products are designed and expected to last extraordinarily long as compared to competitive products.

ALCUF INTERNATIONAL INC., CANADA

Alcuf is a 100% Canadian owned company with all of its extrusions, fasteners, decking, wood and/or glass components manufactured in Canada. Any fabrication or integration of components is also done in Canada, using a Canadian workforce. Alcuf produces high quality aluminum products that are proven to be extraordinary in terms of design, performance, and value. Alcuf engineered systems deliver life cycles unattainable from traditional solutions.

Alcuf International Inc. provides best value solutions to the end user via Authorized Dealers. We are honest brokers and have the end users best interests at heart. This is what makes us unique in our field.

sales@alcuf.com

www.alcuf.com

June 13, 2022

There are 6 typical ways to mount posts *in, at, or on* walls.

1. **IN**: The most practical and inexpensive method of mounting a fence ON and IN a wall is to **CORE DRILL**. This assumes the wall has been properly engineered to withstand the additional wind loading you will be adding to it and that it is wide enough to core drill. If it's an engineered wall designed for the purpose, it typically will be. This is generally the most economical and reliable method available. You would use a non expanding grout to set the posts. Posts only need to be into the wall for 24".

Figure 1: Core Drill

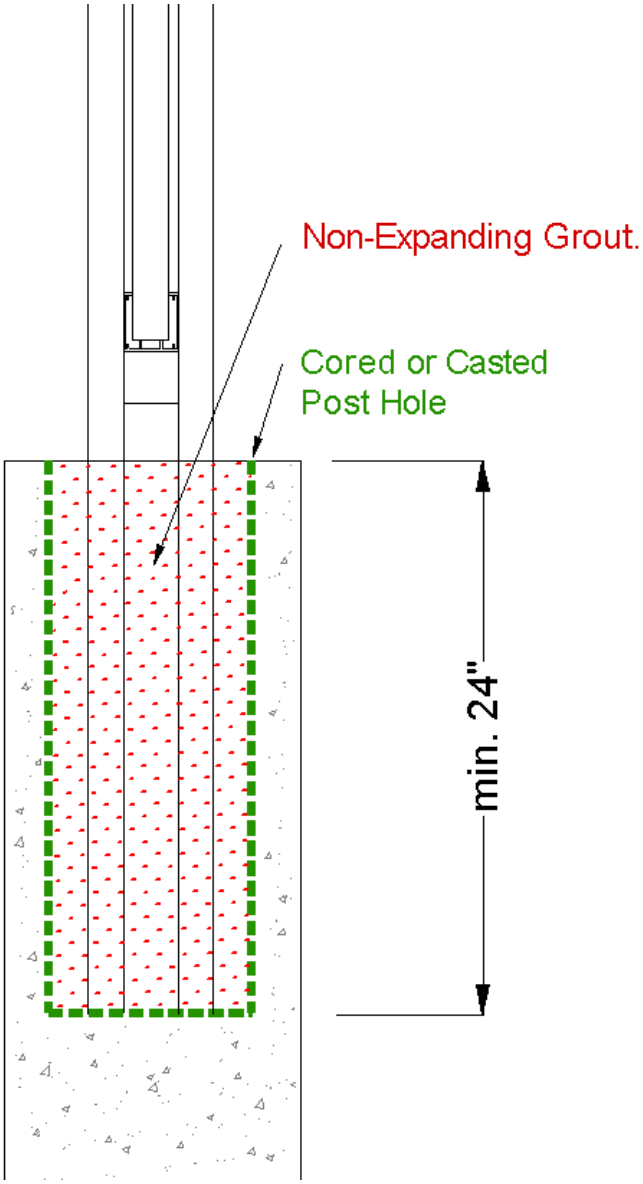


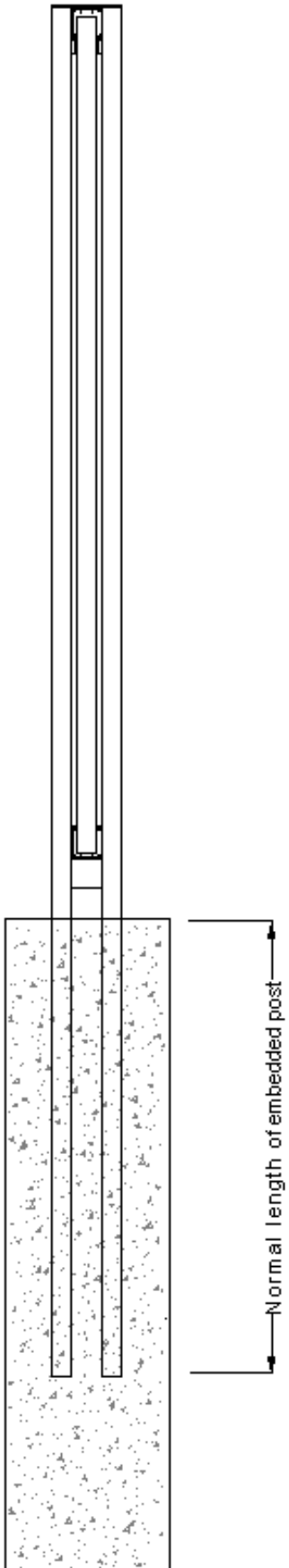
Figure 2: Cored or Casted Post Hole in wall.

2. **IN**: **CASTED HOLES** into the wall is another option. You could use COATED SONOTUBE (or reusable rubber forms) to create cavities in the wall where you would use a non expanding grout to set posts. This is the same as core drilling otherwise.

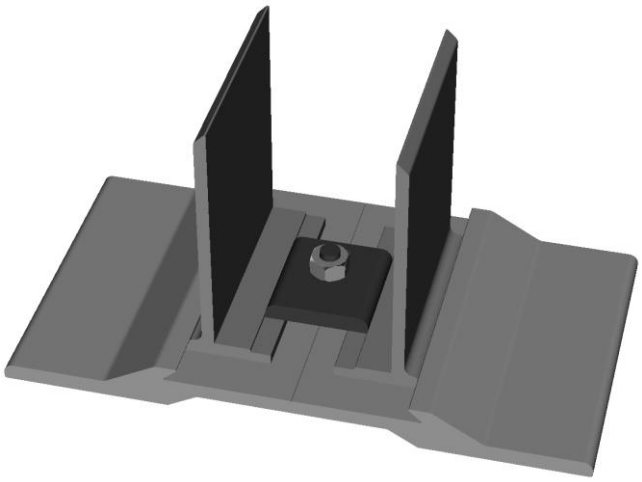
3. **IN**: **EMBEDDING POSTS** into a concrete wall while it's being poured. This means being able to coordinate with the wall builder, and because of that, could be more expensive than method 1. If you are building the wall as well, then you may have an advantage. Of the 3 methods described so far, Core Drilling is the best way forward. The posts need to have their normal length embedded into the wall as per standard specifications.

4. **AT**: **MOUNTING POSTS IN THE GROUND** retained by the wall. This is in some cases may be preferred if while the wall is capable of dealing with the additional wind loading, it may be impractical to fasten directly to. In this case fencing is typically built as per standard specifications.

5. **ON**: Mounting posts using **BRACKETS, PLATES OR FLANGES** is expensive, and most often requires additional engineering costs and time. You will be asked about the wall, is it existing? If so how old? Are the original design/engineering plans available to be able to determine the walls ability to withstand the additional loading. If it's new construction things get easier, but in almost all cases, method 1 is still the most practical, durable, and economical approach. The design of bracket, plates or flanges depend on the type of fence being installed, how high, what type of infill, if it's a noise barrier, what the weight of the system is (typically minimum of 4 lbs. per square foot). Properly coated fasteners will have to be used that won't rust and degrade the wall. We would typically use stainless steel or YC Zinc



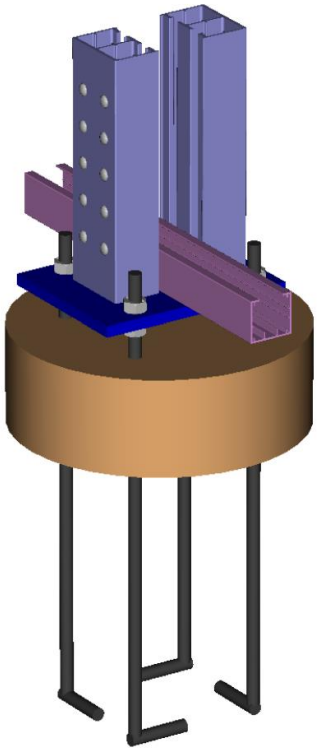
coatings to insure these devices will not rust, or start the wall rusting from the inside out.

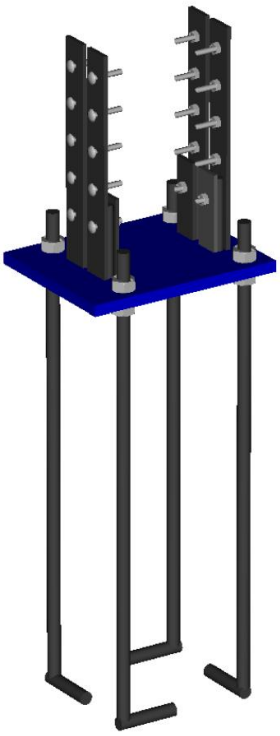


5a. This is an example of a floor flange that would be used on DP1 or 2 lighter load fences.

Depending on loading and wall construction, this will require job specific engineering.

5b. This is an example of a base plate system that is used for noise barriers using the DP3 framework for heavy load barriers.





These base plates replace conventional post setting methods where you would normally set posts directly into concrete footings. These still require the footings, but his DP3 mounting system was designed where it may be preferred to mount posts on base plates that are mounted in conventional bases first, then mount posts to the plates later. The basic design engineering has been done on these.

Estimated costs for this base plate system are approximately 750.00 per unit in early 2022. This type of system requires all the typical care and understanding of the geotechnical report and advice on site specific ground conditions. The design is based on optimum conditions in this regard. There still could be a requirement for site specific engineering for this type of application.

6. IN: Embedding into modern Engineered Wall systems, using conventional bases. Typically SONOTUBEs are inserted into the wall which has appropriate cavities designed that are normally back filled with large clear glandular, but also present a convenient cavity for mounting fence posts. Posts are able to be poured and aligned in the same way they would be if installed in the earth in a conventional manner. There are many different types of engineered wall systems, but more and more you will find walls with built in cavities suitable for this purpose.

Things to consider

Old Walls – has the wall been sufficiently engineered to withstand the additional wind loading you will be adding? Privacy fencing or Noise Barriers typically have a 100% coverage infill resulting in the maximum wind load and weight possible on a wall. If it's an old wall, try to locate the original design engineering documentation to determine if it is fit for this purpose.

New Walls – you have a better chance of obtaining design engineering documents and drawings on newer construction, and if the requirement you are investigating was created at the same as the wall design, it is highly likely the wall has been engineered to deal with the additional loading.

In either case, understand the design and composition of the existing wall before quoting, and insure you are not increasing the risk of the wall failing to retain earth and/or collapsing. You should request the latest stamped drawings available, and consult the clients engineer as to whether the wall was designed to withstand the additional loading a solid infill fence will add.

Note - In cases where you are asked to mount to concrete floors or decks, it is critical that you understand the membrane design and locations. Common examples are roofs for underground parking. Sometimes hard points are in place and have been designed to bolt flanges or brackets to without disturbing membranes. Hard points need to be engineered to deal with the wind load, and system weight, the same as any object you would be fastening to.

ALCUF PRODUCT DESIGN - FENCING

USE CASES FOR A FENCE / BENEFITS OF ALCUF

In general, we would argue that basic use cases for fencing regardless of a specific purpose, require the same level of engineering for structural integrity, and carefully selected dealers to assist you with your specific application requirements, and the installation of your system.

In any case, proper design and engineering is essential to insure decades of "as new" use, at a competitive price, low environmental impact in the manufacture / materials sourcing, and reduced labour requirement by using better materials purposely designed to achieve these results.

1. **Aesthetic / Architectural Element**
    a. **Once Landscape Architects discover Alcuf Fencing, they specify it for Residential, Commercial, and Industrial applications as a reliable system worthy of consideration based on a proven longest term performance history, lowest initial installation management requirement, and minimal (if any) future support requirement. The simple fact that their clients require the lowest total life cycle cost and best system performance attainable for their projects, is enough to make this decision simple. In addition, once they have enjoyed the higher standards of our Authorized Dealer Network, they see Alcuf Fencing and Noise Barriers as a best value solution across the board. Not to mention the modern aesthetic appearance that is compatible with any architectural design.**

2. **Privacy / Security**
    a. **No matter how much privacy and/or security your fencing requirement has to maintain, the primary determination of "as new" performance is the ability for the system to survive the outdoor elements for multiple decades. Alcuf has been available to the consumer since 1974, and in many cases 3-4 decades makes little difference in either case.**
    b. **There are infill's that can be used in Alcuf that are initially more costly than other best value infill's, but any life span can be achieved depending on your budget. WOOD is the most commonly used infill which brings with it a life span that can vary from 25 to 35 years depending on the location (and the spring thaw cycle in specific locations). Given that WOOD as an infill in an Alcuf Fence is properly drained from moisture, and given there are no screws or nails used to fasten the infill in place, it has the ability to live longer inside our unique frame design, and later in life can easily be replaced without having to change the entire framework or reinstalling footings, which are of the most costly elements of your system. This is why WOOD remains the best value solution. Aluminum Extruded (not roll formed) Panels (AEP) are virtually indestructible and can last as long as the framework. Our product is now 48 years old (in 2022) which makes it reasonable for us to say the framework can last over 50 years. The AEP panels will last as long as the framework, since they're extruded with the same high strength alloy.**

c. **In order to make sure your Alcuf Fence stands up for many decades into the future, we have structural engineers reviewing and certifying all of our designs to insure we meet or exceed the national building code and bridge code. Solid infill fences (for privacy, security, or noise reduction) have a significant wind loading in various locations across a country. These design elements have been taken into consideration for your location to determine adequate post spacing, and post base requirements.**

3. **Noise reduction**
    a. **Engineers, Architects, Cities and Provinces have unique requirements for Noise Barriers. As a structurally engineered system, this has been a natural market space for our systems and dealer capabilities. Alcuf Fencing and Noise Barriers are constantly specified for municipal developments and relied on for performance and integrity.**
4. **Access Control**
    a. **Whether your fencing project requires controlled access, or a simple gate to your back yard, our gate systems are rugged and reliable. Generally, as a free standing door (no building framework surrounding it), this is one of the most difficult elements to keep operational at an "as new" level. Accordingly, we have adjustable gate hardware that provides the longest functional operational life available. Noise Barrier gates are typically portal gates (embedded into the fence line) with flush mount hardware to insure minimal gaps between posts and frameworks for noise attenuation. In most cases these are installed off the ground for winter access and are not as affected by ground movement and other elements.**

Other issues to consider when investigating performance.

- **When you sell your home, you want your fence to be looking it's best, not in need of major repair or complete replacement. Resale value of your home is definitely affected by its boundary elements and the neighbours property. Think of a fence as the packaging of your property, or icing on a cake.**
- **Too many fences are installed at great cost, and in 5 years failing. You've seen it, so take a moment and look at Alcuf Fencing. If there is an Alcuf project at 25 years of age that has any failings, it is generally because a contractor needed to remove a section of the fence, but put it back together incorrectly. Often it's a simple matter of spending pennies on new bolts that might have reduced performance at that age. It is NOT expensive to have this done by a dealer, who can (while they're on site) take a look at the entire fence and make minor adjustments that could make a difference in decades to come.**
- **Alcuf Fencing is 100% made in Canada. The only exception to this might be fasteners, like the Grade 5 nuts and bolts we use. They could possibly come from the USA to distributors in Canada. But the primary components are all from Canada. Alcuf is designed, engineered, and manufactured in Canada. The various WOOD infill is also made in Canada.**

Compared to competitive products, Alcuf…

- **is Aluminum and does not rust or rot by nature;**
- **does not need large equipment to install; this means**
- **less personnel, and less time on site;**
- **smaller installation vehicles due to its light weight;**
- **by design requires less labour for the finishing stages;**
- **is completely adjustable for future elevation changes;**
- **is convertible and reusable;**
- **and is 100% recyclable;**
- **has a variety of infill alternatives;**
- **has the lowest total life cycle cost as compared to other alternatives in every product line**

Did you know?

Aluminum is not only a renewable resource, and one of the longest lasting materials, but

75 percent of all aluminum produced since 1888 is still in use!

Source: The Aluminum Association (also from Alcoa and multiple other reliable sources)

alcuf.com

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