DOFASCO

Steel Design

SPRING 2006 | VOLUME 38 | NO.1

Steel Roofing:

a popular choice – attractive, long lasting & low maintenance

Potash Corporation of Saskatchewan

Rocanville Expansion & Compactor Upgrade

55% Al-Zn

THE MAGIC FORMULA FOR ROOFS:
Projected Life of Galvalume Coated Steel is 40 + Years

SPRING 2006 | VOLUME 38 | NO.1

Steel Design

PROJECT SUBMISSIONS

Do you have a project using sheet steel that you would like to see in *Steel Design*? The editor welcomes submissions of completed buildings–commercial, institutional, industrial, recreational, and residential–using components made from steel, including cladding, steel decking, light steel framing, steel roofing, steel doors, steel ceiling systems and steel building systems.

The Editor, Steel Design
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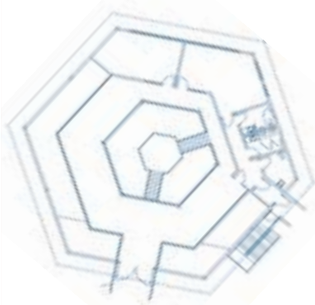
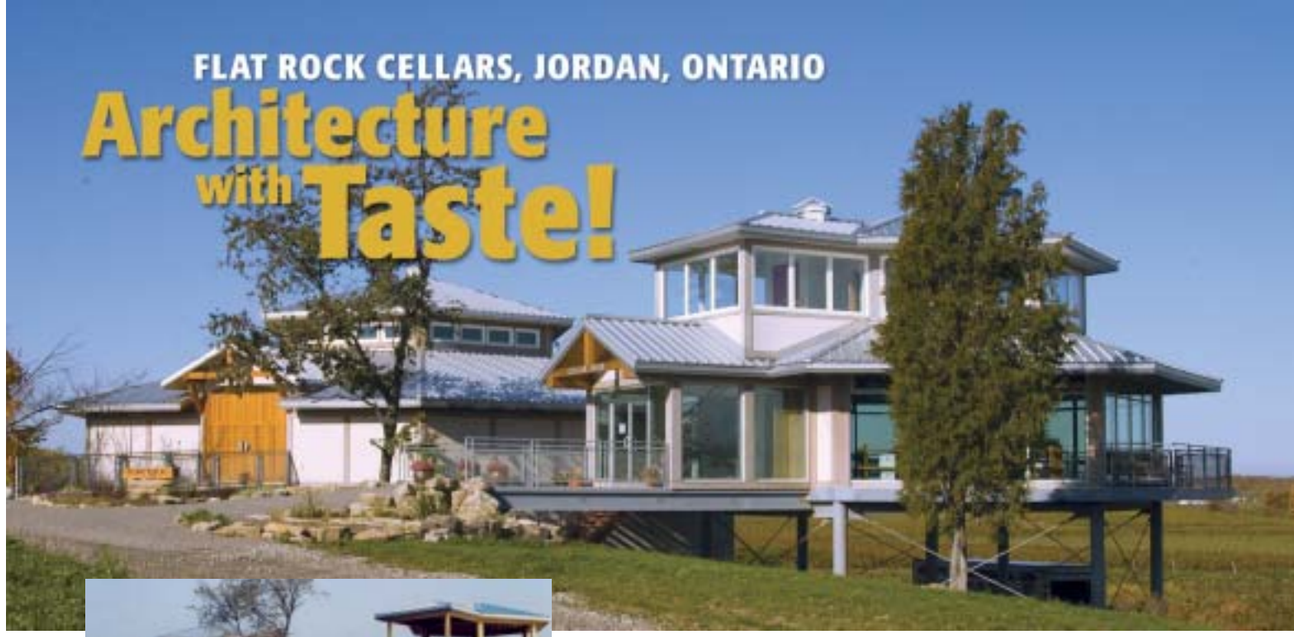
Cover Photo, Flat Rock Cellars: Vytas Beniusis

DOFASCO™
Our product is steel. Our strength is people.

IN THIS ISSUE





Unpainted AZM180 Galvalume Plus™ not only has excellent solar reflectance, resulting in reduced heat transmission into buildings which reduces energy cooling requirements. As this picture shows Galvalume also mirrors the colour of the sky.

Construction of Flat Rock Cellars Winery in Jordan, Ontario was completed in 2004. Architect Brian Porter, Principal of Two Row Architect, created a distinctive hexagonal design offering a 360° panorama embracing Lake Ontario and the Niagara Escarpment.

The emphasis on environmentally friendly performance reflected in gravity flow versus electric pumps, heating and cooling via geothermal systems, and ozone-disinfecting of equipment, extends to construction materials for the 4-level 13,000 sq.ft. structure. Porter: "We combined steel, concrete, glass and wood to create a motif that contrasts with, yet complements the surrounding environment. We use steel in many of our projects – we like its strength-to-weight ratio and its 'tangibility'."

Dofasco's unpainted AZM180 Galvalume Plus was used for Agway Metals 7-150F profile panels. Time has proven and research has confirmed, that Galvalume steel roofs last longer without any significant maintenance and provide exceptional value.

The facility's appearance is dominated by the winery and retail areas' combined 640m² (6,900 sq.ft.) of .61mm (.0239") unpainted AZM180 Galvalume Plus™ roof panel with Agway's 7-150F profile.

Founder Ed Madronich wanted the winery design to achieve architectural beauty. With the help of steel his dream was realized *(see 55% Al-Zn The Magic Formula for Roofs pg.12).*

Design and Construction Team

OWNER:
Ed Madronich

ARCHITECT:
Two Row Architect 519-445-2137

CONSTRUCTION:
Philbrick Construction 905-684-9485

STEEL ROOF CLADDING SUPPLIER:
Agway Metals 1-800-268-2083

PHOTOGRAPHER: Vytas Beniusis

STEEL ROOFING – A POPULAR CHOICE

Attractive, long lasting & low maintenance

1 The owner of this century home in Bayfield, Ontario chose the Classic Shake in the Driftwood colour because of its energy efficient qualities. Driftwood is one of Dura-Loc's Energy Star® qualified colours available.

2 The Woodshake profile in a variegated Weathered Wood colour was chosen for this re-roofing project in rural south-western Ontario. The batten mounted profile was chosen for its appearance and durability.

3 This Guelph, Ontario home was reroofed with 678m² (7,300sq.ft) of the popular Continental profile found in the Signature Series. Colour chosen Weathered Slate to compliment the homes outer appearance. The owner chose steel because of its long term durability and hence life cycle cost benefits.

4 The Shadowline profile in the Signature Series, coloured Weathered Slate was installed on this university building.

5 This Oakville home features Continential Tile in the Briarroot colour, from Dura-Loc's Signature series and was installed on wood battens directly over existing worn out shingles. Durability and attractive architectural appearance ranked high on the owner's reasons for choosing the system.

6 Continential Tile coloured Terracotta, in the Signature series was installed on the Waterloo Fire Hall.

When considering a new roof, several factors must be taken into consideration: price, durabiliy, maintenance, appearance and energy efficiency. Dura-Loc Roofing Systems Ltd., a ceramic granular coated steel roofing system manufacturer, delivers superior performance on these measures with long life and low life cycle cost, thus offsetting the higher initial cost, plus visual appeal and it is virtually maintenance free.

Made from highly durable Galvalume™ steel protected with an ultraviolet resistant acrylic, is durable, lightweight and available in a variety of styles and finishes to blend with an array of architectural designs. Four different series – Signature, Classic, Dimensional and Impressions – offer a variety of profiles in Energy Star® qualified colours for both residential and commercial applications. The look of other traditional roofing materials, such as clay tile, Victorian slate and natural wood shingles are replicated with Dura-Loc's four styles.

Both the Signature and Classic Series profiles are complete with a self-ventilating/batten mounted system. Dura-Loc recommends that these batten mounted systems should be installed by a reputable and experienced roofing professional. However, their direct to deck systems which include the Dimensional and Impressions Series are great for the "do-it-yourselfer". Dura-Loc's direct systems require limited tools, installation instructions are on the packaging and they don't require battens.

Dura-Loc's metal roof systems are also impact and fire resistant. The lightweight, long-lasting steel panel system has proven to be resistant to wind and hail damage and the most stringent UL and FM fire and wind ratings. All have superior weathering and performance characteristics and are warranted against manufacturing defects for up to fifty years. The homes shown on these pages are located throughout Ontario and feature both new and re-roofing applications.

STEEL ROOFING MANUFACTURER:
Dura Loc Roofing Systems Ltd. (888) 224-3541

STEEL ROOFING INSTALLER:
Steel Roofing Installer: DL Roofing (519) 688-2200

Rocanville mine prior to expansion

POTASH CORPORATION OF SASKATCHEWAN

Rocanville Expansion & Compactor Upgrade

The upgrade portion of the project involved the replacement of old cladding that had a thin film coating which was not standing-up to the harsh environment of the site. Also involved was the expansion of the compactor, doubling its size.

As shown in the accompanying photographs, steel cladding with a thick film coating in the Barrier Series was selected for the wall cladding. Barriercoat prepainted steel, with a galvanized substrate, was developed to provide improved corrosion protection for interior and exterior cladding in highly aggressive industrial environments. Barriercoat, as the name implies, has superior barrier properties compared to conventional paint systems, due to the ability of the plastisol coating to be applied at much greater thicknesses. This two-sided application delivers the needed protection to the exterior and interior surfaces of the cladding.

The expansion of the plant starts where the conveyor exits the building. The first two sets of stripes is the older cladding with a thin film coating. The thick film Barriercoat cladding is being installed in the foreground.

The grey cladding in the background is aluminum sheet which has faded and is now degrading and may be replaced with Barriercoat in the near future to match the cladding on the new expansion.

Both the L-32 and Valu-Clad supplied by the Roll Form Group are .76mm (.030") 8/8 (mils) painted QC1546 Interior White both sides. The L-32 was used as an exterior sandwich wall liner and the Valu-Clad was used to enclose the elevator shaft inside the building and on the interior of the outside wall to keep dust from the wall girts, thus extending the life of the wall girts.

135,000 sq. ft. of 8/8mil Barriercoat with the S-15-SB profile exterior cladding coloured QC1508 Bone White/QC1546 Interior White and QC1558 Tile Red/QC1558 Tile Red was installed. 32,000 sq. ft. of steel deck manufactured from 8/8mil Barriercoat coloured QC1546 Interior White on both side, was used under the built-up roofing and 5,000 sq. ft. as floor deck.

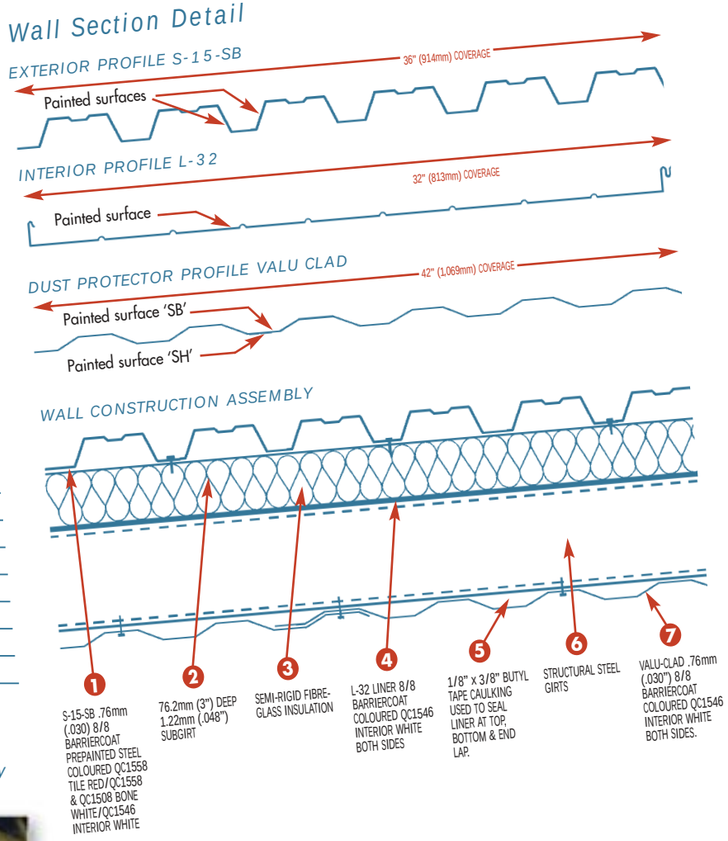
Barriercoat's thick coating offers a remarkably effective long lasting barrier against chemically aggressive environments. The 8mil (.008", 200 microns) thick plastisol coating impedes attack by alkalies, acids, salts and bleaching agents. The textured coating resists through coating impact damage. With more than 30 years of proven performance in harsh industrial field applications, Barriercoat coating has successfully stood the test of time as the premier choice for industrial buildings in harsh environments.

Potential Applications

- Power Generating Stations
- Water treatment Plants
- Sewage Treatment Plants
- Mining Plants
- Pulp and Paper Plants (1)
- Chemical Plants (1) (2)
- Marine Environments
- Sand, Soil and Ice Abrasive Environments
- Smelter Operations (1)

Barriercoat's thick coating offers a remarkably effective long-lasting barrier against chemically aggressive environment.

Wall Section Detail



Design and Construction Team

OWNER:
Potash Corporation of Saskatchewan

ENGINEER:
AMEC 306-477-1155

GENERAL CONTRACTOR:
Supreme Steel Ltd. 306-975-1177

STEEL CLADDING CONTRACTOR:
Thermal Systems KWC Ltd. 403-250-5507

STEEL CLADDING SUPPLIER:
Roll Form Group 1-800-233-6228

(1) Avoid temperature exposure over 100°C.

(2) Avoid exposure to solvents such as alcohols, keytones, ethers, chlorinated solvents and aeromatics.

Classrooms and workshops of the Commerce and Technology building featuring prepainted Z275 galvanized canopy roofs.

Glazed attic level above the classrooms showing the 3-dimensional trusses and Regent Gray QC8730 prepainted Z275 galvanized roof.

Unpainted AZM180 Galvalume Plus™ canopy and structural framework over workshop Areas.

Prepainted Z275 galvanized and unpainted AZM180 Galvalume Plus™ steel roofs provide long life, low maintenance and energy efficiency.

UNIVERSITY COLLEGE OF THE CARIBOO, KAMLOOPS, BC

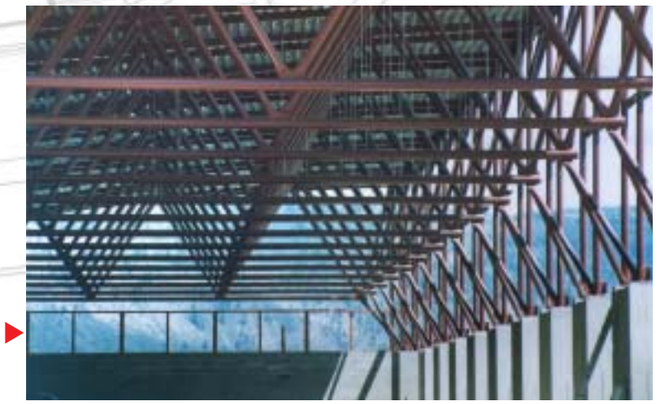
Steel plays an integral part in Technology Addition

Successful design reflects both need and form, yet reflects the demands of the surrounding environment. The classroom and workshop building, which houses the technology and trades department of U.C.C., achieves both.

According to Peter Buchanan, of Stantec Architecture, "the intention was for the building to be rational and technological in its construct, to reflect the inhabitants educational stream, and provide maximum flexibility for its current and future users". Peter goes on to state, "the solution was an elegant, repetitive structural system that speaks to order and efficiency while maintaining column-free workshop spaces for maximum flexibility".

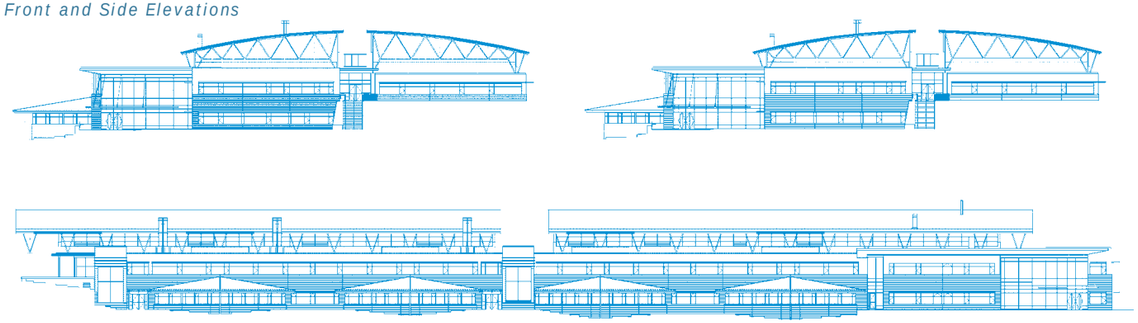
In the workshop area 3-dimensional repetitive painted steel trusses, with depths ranging from 1100mm to 3700mm (36" to 145"), and spanning 20 metres (65ft) and rest on top of cantilevered reinforced sandblasted concrete piers, efficiently utilize ZF075 galvanneal structural steel deck.

The distinctive prepainted Z275 galvanized double roof of the facility is clad with 457mm (18") wide .607mm (.0239") thick Snap Loc II panels, coloured Regent Grey QC8730. The Canopy roofs over the shop area are also 607mm (.0239") Snap Loc II panels, however



The clarity of the structural elements and the details of the assembly contribute to the educational objective of this technical college.

Front and Side Elevations



Upper roof detail.

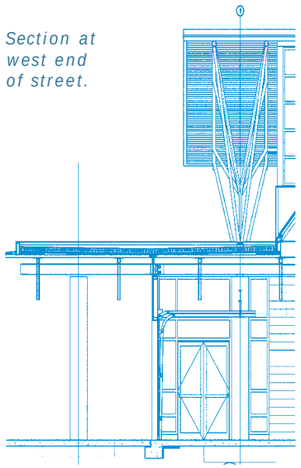
are 304mm (12") wide and are unpainted AZM180 Galvalume Plus™. The feature roofs over level one are 304mm (12") wide .607mm (.0239") Snap Loc II panels of prepainted galvanized, coloured Metallic Copper QC3234.

The result, open spaces which offer flexibility and increase the impression of space. Infill and demising walls are concrete block, while the classroom spaces are steel framed, both are clad with 7/8" Corrugated profile 'rain screen' prepainted Z275 galvanized exterior cladding coloured Regent Grey QC 8730. Brick is utilized at lower levels.

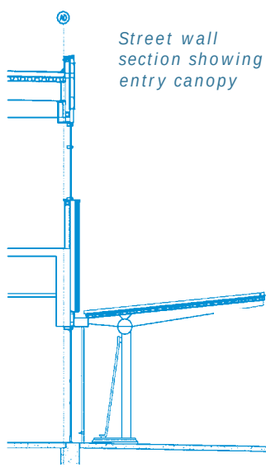
The striking feature of the design is the fully glazed attic level, which allows the two roof canopies to appear to float above the first two levels. The overall effect is a sense of graceful utility, that is both cost effective and energy efficient and as Peter Buchanan says, "recognizes that a substantial building can be constructed from simple materials".

The internal corridor extending from the entrance is covered by a terrace supported by a steel deck on trussed beams with a 5metre span (16-1/2').

Section at west end of street.



Street wall section showing entry canopy



Design and Construction Team

OWNER:
University College of The Cariboo

ARCHITECT:
Stantec Architecture
(formerly Architectura) 604-331-8079

STRUCTURAL ENGINEERS:
Bush, Bohlman & Partners
604-688-9861

GENERAL CONTRACTOR:
D & T Developments 250-372-2852

WALL CLADDING & ROOFING INSTALLER:
(DHS)Flynn Canada 604-525-3722

CLADDING & ROOFING SUPPLIER:
Vicwest 1-800-387-7135

FLAT ROOF INSTALLER:
Western Roofing 250-374-0154

STEEL ROOF DECK SUPPLIER:
Roll Form Group 1-800-233-6228

LIGHT STEEL FRAMING & ACOUSTICAL CEILING:
Kodiak Drywall
250-765-3033

LIGHT STEEL FRAMING SUPPLIER:
Bailey Metal Products Ltd.
1-800-668-2154

PHOTOGRAPHY:
Martin Tessier

St. Mary's River Beach Pavilion

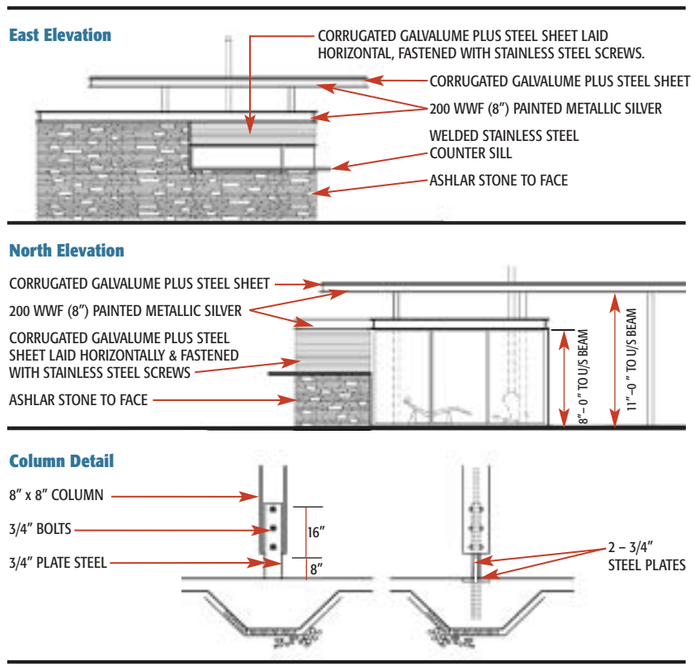
Due to structural stability challenges on this small yet interesting beach pavilion, it was decided to use the barroom to hide the bracing system for the structure. The walls of the structure can slide away and be recessed into the adjoining stone clad storage area. Two Grade 350 W200 x 36 (W8 x24) steel columns were placed at the north wall, with their strong axis oriented in the north-south direction. In the north-south direction two rigid frames were designed utilizing Grade 350 W200 x 36 (W8 x 24) columns rigidly connected to the roof beams.

For the east-west direction, cross bracing was placed between the columns, which, together with the rigid roof diaphragm, provides lateral stability in the east-west direction. Ideal Roofing's .45mm (.0179") corrugated panels made from Dofasco's AZM180 Galvalume Plus™ were used for the wall cladding as well as the roof.

In order to strengthen the knife plate connections at the ground and the roof, to withstand snow loads, a recessed filler plate was installed between the knife plates, thus providing the required stiffness for these connections.

The steel roof supports front to back and side to side are W150 x 22 (W6 x 15) and the visible columns are W150 x 37 (W6 x 25). The bar room at the rear was used to hide the structures bracing system.

Unpainted AZM180 Galvalume Plus™ .45 mm (.0179") was used for roof cladding which contributes to the rigid roof diaphragm.



Design and Construction Team

OWNER:
Dr. Kent and Francine Floreani

Architect:
David Ellis Architect 705-779-2894

Structural Engineer:
STEM Engineering Group
705-942-6628

Electrical & Mechanical Engineering:
EPOH Inc. 705-949-5291

Contractor:
VanMark Builders 705-759-4525

Steel Roofing Supplier:
Ideal Roofing Company Ltd.
1-800-267-0860

Steel Roofing & Cladding Installer:
MJM Roofing and Siding 705-945-9001

Columns and Beams:
RoVon Construction 705-759-2011

Photography: Kent Floreani

THE MAGIC FORMULA FOR ROOFS

The projected life of Galvalume Coated Steel is 40+ Years

A superior long-life roof system requires not only the right sheet material, but also good design, installation and maintenance practices. Both the North American and the European roof surveys confirm the strong performance of bare, unpainted 55% Al-Zn sheet steel Galvalume™.

Based on the field inspection results, all roofs surveyed are projected to give a life in excess of 40 years (some will achieve their half century) without needing major maintenance. The superior corrosion resistance of bare (unpainted) 55% Al-Zn metallic coated steel is established beyond any reasonable doubt. All the roofs were in good to excellent condition both technically and aesthetically – regardless of age, location and environment.

The 55% Al-Zn (Galvalume™) roof panels performed outstandingly well in North American regions subject to acid rain and harsh winters. Additionally, the buildings surveyed benefited from the excellent solar reflection of 55% Al-Zn sheets, which exceeds the requirements of the US Environmental Protection Agency's ENERGY STAR® Cool Roof program.

It should be pointed out however, that designers and installers should be careful to select only those materials that are most compatible with the 55% Al-Zn (Galvalume) coating, and should be discouraged from using shorter life galvanized steel parts on a long-life 55% Al-Zn roof system.

For more information and details go to:
www.dofasco.ca ***or*** *www.cssbi.ca*

A PDF version of the study is available on the websites.

Galvalume and Galvalume Plus are trademarks of Dofasco in Canada.

Location:	Indianapolis, Indiana, USA
Environment:	Urban
Slope:	1 degree
Age:	30 years

Correct specification of fasteners is important to ensure maximum roof life.

Location:	Appleton, Wisconsin, USA
Environment:	Industrial
Slope:	1 degree
Age:	30 years

Dirt has affected the cosmetic appearance of this roof after 30 years, but there is no damage to the coating which continues to perform well.

Location:	Appleton, Wisconsin, USA
Environment:	Industrial
Slope:	1 degree
Age:	30 years

The main picture confirms the good condition of this roof, technically and aesthetically. Picture A demonstrates that the roof has to accommodate a number of ancillary structures, some showing advanced deterioration. Picture B shows that there is only minimal damage around fastenings and at the drip edge.

Location:	Faluden, Sweden
Environment:	Urban
Slope:	14 degrees
Age:	18 years

Careless routine maintenance. Here a storm filter was plugged by debris, due to lack of regular maintenance. Ponding resulted, and corrosive agents released by the bitumen used to seal roof laps had caused red rust. A neutral cure sealant should have been used.

Location:	Omaha, Nebraska, USA
Environment:	Urban
Slope:	1 degree
Age:	29 years

No problems at the drip edge after nearly 30 years.

Location:	Cumbria, UK
Environment:	Rural
Slope:	22 degrees
Age:	18 years

The 18-year-old 55% Al-Zn roof contrasts with galvanized panels on the right, which had begun to show rust after only 6 years.

Location:	Faluden, Sweden
Environment:	Urban
Slope:	6 degrees
Age:	15 years

Poor installation practice. Iron debris left on the roof has rusted and stained the roof, although both fastener and sheet are in good condition and there is no accelerated corrosion in this case. Good installation practice and post installation clean-up would have avoided this.

The Japp/Hand Residence

Designed by Patrick Avice du Buisson of MZA Architects the home sits on a wooded lot overlooking the Cumberland River in Tennessee. The challenge according to Buisson was that both artists wanted a residence that could serve as both a home and two separate work studios, but had very different visions of what the end result should be. The design consists of two box-like forms.

The first box, is a three story rectangular structure constructed of galvanized steel, while the second box is a cube made of rough sawn plywood that sits above the residence's entry way.

Architectural Record 8/2004 ■

Thomasville High School

Thomasville, GA

Thomasville-based designer, Leon Lynn, selected steel roofing for this 11,148m² (120,000 sq. ft) school project due to its structural capabilities and weathertightness. Formed from .61mm (.0239") prepainted Galvalume, the 457mm (18") snap-lock roof panels have a custom Terra Cotta finish.

Metal Architecture March/05 ■

Roosevelt Park Pavilion, Longmont, Colorado

Steel Building System (SBS) – an innovative approach to an outdoor entertainment pavilion.

The 1,308m² (14,082 sq. ft.) Roosevelt Park Pavilion in Longmont, CO, is an entertainment venue that was constructed using a pre-engineered metal building system.

The 51m x 23m x 9m (168' x 75' x 30') pavilion designed by Pahl, Pahl and Pahl of Denver, CO., features a 17m x 8.5m (56' x 28) entry and 4.25m x 34m x 1.8m (14' x 111' x 6') architectural cap. Topping the pavilion is 15,000 sq. ft. of Colonial Red standing seam roofing formed from .61mm (.0239") Galvalume-coated steel.

Metal Architecture 9/03 ■

Web Bridge, Melbourne, Australia

Suzanne Stephens reportes in the June '04 Project Portfolio section of Architectural Record, on the Webb Bridge which spans the Yarra River as part of the Docklands redevelopment in Melbourne, Australia. The bridge is "a writhing, tubular structure that incor porates two segments of the former railroad bridge", and becomes a unified form. Arup Engineers provided the "structural solution of steel box girders, cranked to allow a curved form to take shape".

Denton Corker Marshall Architects
Metal Construction News, June/05 ■

Trans Canada Trails Pedestrian Bridge, Halls Creek, Moncton, New Brunswick

The project is part of the Trans Canada Trail system and spans 110 feet across Halls Creek while following the Petitcodiac River. The bridge was manufactured in three sections in Fredericton, then transported and erected in Moncton by L & A. Metalworks.

The panels for the roof, which flexes in two directions, were supplied by The Roll Form Group and are their .91mm (.036") Contour Clad panels coloured QC8259 Tile Red.The bridge framing was fabricated from CSA-G40.21,350W hollow steel sections (HSS) of varying sizes: 254mm x 254mm x 12.7mm; 203mm x 203mm x 9.5mm; 152mm x 152mm x 4.8mm; 102mm x 102mm x 4.8mm; 76.2 x 50.8mm x 6.35mm (10 x 10 x .500; 8 x 8 x .375; 6 x 6 x .188; 4 x 4 x .188 and 3 x 2 x .250). ■

Design and Construction Team

OWNER
City of Moncton, 506-853-3529

ARCHITECT:
Architects Four Limited, 506-857-8601

STRUCTURAL ENGINEERS:
Hachey Consultants, 506-856-9620

ELECTRICAL ENGINEERS:
R.E. LeBlanc Consultants Inc.
506-858-0950

GENERAL CONTRACTOR
L & A Metalworks Inc., 506-458-1100

CLADDING INSTALLER:
L & A Metalworks Inc.
506-458-1100

ROOF CLADDING SUPPLIER:
Roll Form Group
1-800-233-6228

HSS SUPPLIER:
Russel Metal, St John
1-800-222-9604

PHOTOGRAPHY:
Architects Four Limited

Flow Hummer Dealership

Winston-Salem, N.C.

Designed by Bradley & Ball Architects of Greensboro, NC, in keeping with GM's Hummer dealership prototype design, this 214m² (2,300 sq. ft.) showroom features curved metal roofing. The curved roof is manufactured from 1.9mm (.075") 609mm x 190.5mm (24" wide x 7-1/2") deep Galvalume Plus panels. ■

Prepainted Steel Tops Apartment Building

The Melrose apartments in Minneapolis, MN are topped with striking prepainted galvanized panels. The .61mm (.0239") panels are coated with a PVDF finish in Winter Blue.

Architect: Collaborative Design Group
General Contractor:
Adolfson & Peterson Metal Architecture ■

EDITORIAL INQUIRIES

We would like to hear from you!

If you have comments about this issue or a project you would like to see in an upcoming issue of **Steel Design**, please send a description of the project, include photographs, to:

The Editor, Steel Design
1039 South Bay Road
Kilworthy, ON P0E 1G0

Or email:
markdir@sympatico.ca

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