



American
Galvanizers
Association

Galvanize the Future Essay

Samantha Davis, K-State University

RECOMMENDATION TO UTILIZE HOT-DIPPED GALVANIZED STEEL



[1]

PREPARED FOR:
MR. JONES

PREPARED BY:
SAMANTHA DAVIS



Background and Project Understanding

Mr. Jones is the local owner of a seafood restaurant called Gloucester Waterfront and Marina. He has hired SD Architects to design a restaurant off of Gloucester's Harbor Cove marina that is innovative, eye catching, ever-lasting for future generations, but also within budget. The site is 87,000 sq ft and sits on the busy Rogers Street that runs right through Gloucester, Massachusetts right off of the waterfront. Mr. Jones has come to love the ideas SD Architects has come to offer. When presented to Mr. Jones, he fell in love with this idea of a metal perforated screen to let filtered light into the restaurant. This idea that came to fruition from an abstract representation as a lobster trap one may see frequently along the waterfronts of Cape Ann. The back of the restaurant will feature a covered, patio for outdoor seating off the water. Gloucester Waterfront Grill and Marina will serve as a main attraction for the entire town as well as the hundreds of thousands of tourists that come to Cape Ann every year looking for the best seafood in town. An added feature and large source of revenue will come from the offered rental boat rides, that provides a bar for a fun night out on the water.



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But during their last meeting, lack of knowledge and decisions regarding costs have slightly clouded essential decisions about protected applications, including the vision to use hot-dipped galvanized steel (HDG). Samantha knows that decisions must be made and has sent Mr. Jones the reasons she believes HDG steel is the best solution for the Waterfront Grill, giving supporting evidence. This way Mr. Jones can feel confident Samantha is leading him to the best solution regarding their design intentions.

MEMO

From: Samantha Davis, Project Architect

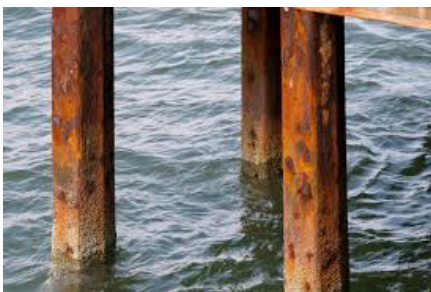
To: Mr. Jones, Owner of Gloucester Waterfront Grill & Marina

Date: 3/31/2018

Hello Mr. Jones!

During our last meeting, I could see the look of wariness on the option to use hot-dipped galvanized steel (HDG). I just wanted to let you know the reasons I believe it is the very best solution for your restaurant's design and hopefully clear up any concerns. HDG has immense benefits dealing with durability, longevity, sustainability, and aesthetics. Some sources on the internet will warn against some company's high prices or going with companies with little experience. Today, there are numerous companies that offer top quality HDG steel and services at affordable prices. An easy way to find these is from the American Galvanizers Association (AGA) which we can go over together later[2]. For our particular situation, HDG steel would have vast benefits for us due to the climate and image of the restaurant. Let me explain to you why it is worth it.

The durability. The durability of HDG steel is literally unmatched and can be used in the harshest environments. Meaning that it will last decades longer. HDG steel is basically taking the protective layer you would normally apply to other steel by painting or coating and infusing it into the metal. They do this by taking all the material surfaces and dipping them into and coating them with molten zinc completely. It is quite natural for other protective coatings on steel to rust quickly and wood to start rotting or warping because of atmospheric conditions faced over time. With HDG steel, the protection is twofold: there is a physical protection from moisture and air and there is an additional electrochemical cathodic protection with the zinc, making it superior when it comes to corrosion resistance[3]. The image below to the left we can see that corrosion and rust have been very damaging for Gloucester in the past. HDG steel would be a great option to help prevent these damages and add to the Waterfront Grill's longevity. The image to the right shows us HDG steel strongly withstanding corrosion and rust.



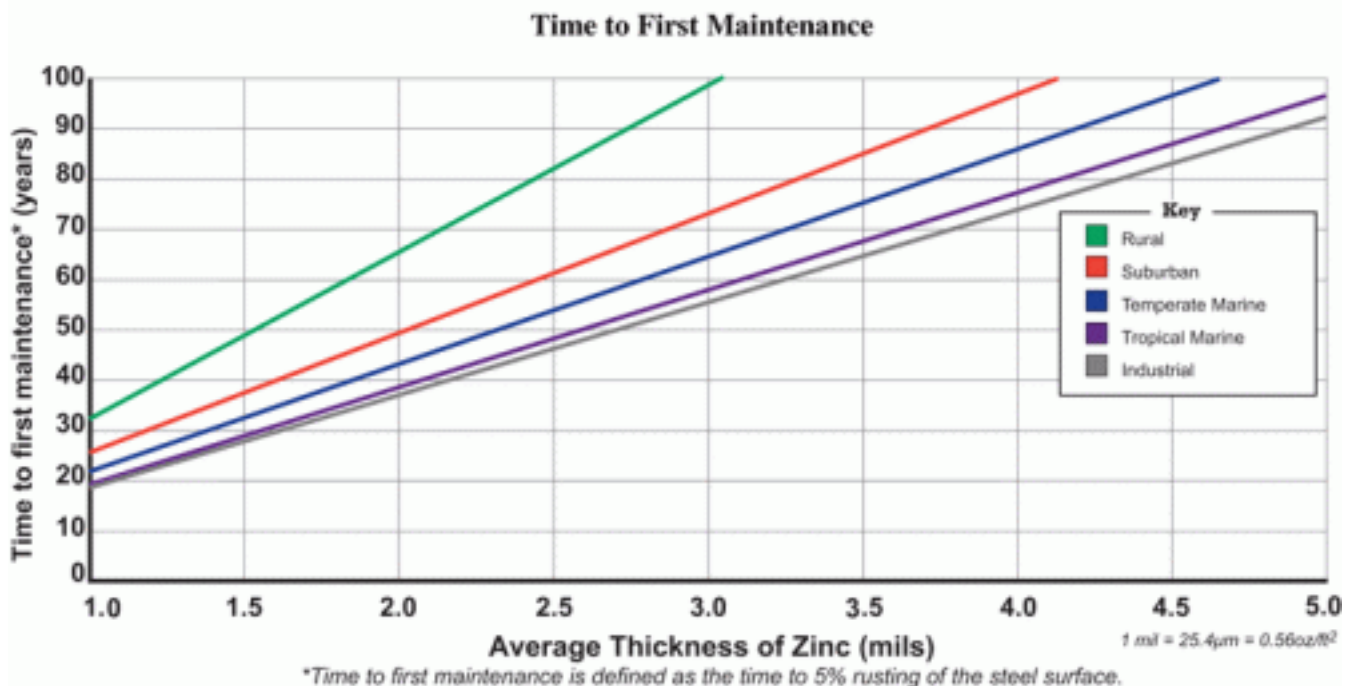
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The longevity. HDG is great because almost all climatic conditions can withstand the different corrosive elements for the full intended design life of the structure. It could be left completely exposed to UV rays, snow, water, embedded in soil or concrete and be reliable to our expectations. The performance of HDG steel depends on five factors including temperature, humidity, rainfall, sulfur dioxide concentration in the air (pollution), and air salinity. Those factors will vary, but generally we

see a corrosion rate of 1/30 of what bare steel can prevent in the same environment[6]. They have been sampling and testing for over a century in five different environment types: industrial, rural, suburban, tropical marine and temperate marine. The length of time that a structure can do without maintenance will depend on the zinc thickness and the atmosphere. As you can see in the chart below, the thicker the zinc coat is, the longer the structure can go without any maintenance. According to ASTM A123, the governing specification for HDG, steel ¼-inch thick or greater must have at least 3.9 mils of zinc on the surface, but more often than not, there will be greater than the minimum requirement[7]. For example, if we were to use a zinc thickness applied to say 4.0 mils, and if the location of the restaurant is temperate marine, then the steel in the structure's time to first maintenance wouldn't be for approximately 75 years. We can use this data as well as adding in specific parameters for our environment, such as water pH levels and climate exposure to get a more precise estimate for how long the time to first maintenance is for the Waterfront Grill.



[7]

HDG is unique because all the material's energy and emission outputs are only happening in the production phase. Meaning, HDG requires no maintenance during the service life of most structures. This is because it lasts so long! This is a huge pro because this means no repair and maintenance cost for you. This saves more than you would think. The American Galvanizers Association has developed the Life-Cycle Cost Calculator (LCCC) which is basically an online calculator for a project to compare the initial and life-cycle costs of hot-dip galvanizing to more than 30 other protection systems[8]. We can go through this together, so you can see the differences at our next meeting.

The sustainability. Many people recommend using HDG because 90% of the steel in this product, as well as 80% of the zinc can be recycled. That way the steel can be easily salvaged and reformed into useful, reusable products without the loss of any physical or chemical properties. This meaning that the integrity is infinite. LEED standards recognizes this material for its recyclable properties and will grant projects credits for using HDG steel because as a recycled product, it uses one third less energy to produce than original steel[9].

Not only this, but HDG steel is made from two natural and abundant elements – zinc and iron ore meaning that it does not introduce disruptive or harmful elements to the eco-system. Zinc makes up 98% of the material and truly is an incredible element. All living things require zinc to live and of all micronutrients, zinc has the strongest effect on our immune system, preventing disease and fighting infection[10].

The aesthetics. Using HDG steel allows for a very uniform and even coating completely covering all material surfaces of both the exterior and interior. This allows for sharp edges and corners to be protected optimally. This coating is also very robust, meaning that it can withstand minor bumps and bruises when it comes to transportation and mounting. As HDG steel weathers and zinc patina forms, the coating becomes a uniform matte gray that we can leave exposed and it can withstand tough elements. Because of the natural finish, HDG can complement and blend in with the surrounding environment while providing a visual piece of mind that the steel is in good condition. This could truly be beautiful, giving an honest-to-material aesthetic appeal that works well with our design intentions.

The natural finish is just an added option, but not the only option. If we specify a duplex system, we can galvanize and then paint or add a powder coating of almost any color desired. This will ensure that any protection benefits are not compromised. The renderings we have proposed to you, like the image to the right would be a duplex system.

This also provides more than just aesthetic qualities. With HDG steel as a primer with a paint or powder coating, the first time needed to maintenance extends 1.5 - 2 times what it would be for bare steel[11]. Of course, touching up is inevitable eventually, but the process is both inexpensive and easy. A small amount of the powder coating will be removed around the nick or area in need of repair, it will be wiped clean with an isopropyl alcohol wipe and then repaired with paint using a brush application [12].



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Summary. As always, I am extremely excited for you Mr. Jones - Gloucester Waterfront Grill & Marina will be an incredible edition to the Gloucester Harbor Cove. It will serve as a main attraction for the entire community as well as the hundreds of thousands tourists that come to Cape Ann every year. With my professional experience in the past and knowledge of hot-dipped galvanized steel I could not recommend anything but this. If you have any concerns at all feel free to contact me, I would love to hear your thoughts on the matter.

Sincerely,



SOURCES

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Galvanize the Future Essay

Samantha Davis, K-State University

DISCLAIMER:

Please note that this essay is a completely fictional proposal, which is submitted to be considered for the American Galvanizers Association's (AGA) Galvanize the Future: a Richard L. Brooks Memorial Scholarship essay contest, and should not be interpreted as anything other than that. The architecture firm is fake and not suggesting I am licensed in any way. Mr. Jones is a fictional client. The images represented as the proposal for the 'Gloucester Waterfront Grill and Marina' is in reality designed by spanish architecture studio, SCOB which transformed barcelona's prominent waterfront port. The project is also known as 'OneOcean'.

My name is Samantha Davis and I am currently working towards a Masters degree in architecture at Kansas-State University, USA. My first two years, were spent at the University of Missouri-Kansas City. Throughout my studies, I have found the use and applications of materials fascinating. I strongly believe in the limitless possibilities that hot-dipped galvanized steel has to offer and interested in seeing a wider use of it's application. I believe it is important to approach design challenges with imagination and I have chosen a fictional design proposal to reflect that. I am excited to use hot-dipped galvanized steel in my future career and in making this essay, I feel more prepared to do just that. I am extremely grateful organizations such as the American Galvanizers Association provide incredible amounts of resources and opportunities to prepare students such as myself.

Thank you so very much for considering me for the Richard L. Brooks Memorial Scholarship!

Sincerely,

SAMANTHA DAVIS

Samantha Davis