American Society of Landscape Architects
2015 Annual Meeting Education
Monday November 9, 3:30 pm – 5:00 pm

Constructability & Cost Considerations for Specifying Natural Stone Hardscape Elements

SESSION MARKETING STATEMENT:
Significant advancement in quarrying and fabrication technique and implementation of green technology within the natural stone industry have created the ability to produce more cost effective products, allowing for new opportunities for the use of natural stone in landscape designs.

CATEGORIES:
Instruction Level: Intermediate
Primary Topic: Specifying natural stone products
Secondary Topic: Life Cycle Cost Comparison and Sustainability considerations for specifying hardscape products

SOURCES
www.williamsstone.com Source for Granite curb specs and CAD details

www.americangranitecurb.com Contains Specifications and life cycle and structural analysis of Granite Curb

www.buildingstoneinstitute.org Positioning our members as "the source" of knowledge, information, products, and services for the design community and end user.


http://isse.utk.edu/ccp/ Life-cycle Datasets Case studies green building.

www.marble-institute.com An authoritative source of information on standards of natural stone workmanship and practice and the suitable application of natural stone products.
Todd Curran  
tc@curranco.org  
Curran Company LLC – Homer, NY

Todd Curran is a construction consultant with thirty years experience in the site and highway construction industry. Formerly president and general manager of Syrstone Inc. - one of the country’s largest installers of curbing & segmental paving, Todd has experience sourcing and installation of natural stone products for hardscape installations on both public and private projects. He is a founding member of the American Granite Curb Producers Association, bringing field experience to the design and specification process.

Daniel Wood  
dwood@lurveys.com
Lurvey Landscape Supply  
Volo, IL  
Member

Daniel Wood has been in the landscape and masonry professions for over thirty years, focusing on natural stone, hardscape materials and roof deck products. Daniel has taught at various Illinois institutions and speaks to numerous organizations, agencies and companies providing educational presentations to businesses as a part of his role at Lurvey's. He travels extensively and regularly visits quarries and production facilities to stay abreast of trends in the stone industry. Daniel serves as treasurer on the executive board of the Building Stone Institute, is ICPI (Interlocking Concrete Paver Institute) certified, and holds a LEED Green Associate certification.

Tony Chiaravalloti  
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Williams Stone Co. – East Otis, MA  
Member

Tony Chiaravalloti is dimension stone product manager at Williams Stone Company and has been active in the stone industry since 2000. As project engineer responsible for supplying granite for the National WWII memorial, Tony coordinated the quarrying and fabrication by the industry’s leading granite companies. Tony has presented seminars on best practices in the specifying of stone for commercial building and landscape projects and is a leader in the use of technology in the stone business. Through Building Information Modeling, he has pioneered the use of BIM software in stone design to add accurate 3D rendered stone into coordination models.

Beka Sturges ASLA  
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Reed Hilderbrand Landscape Architecture – New Haven, CT

Beka Sturges is an Associate Principal at Reed Hilderbrand and directs the firm’s presence New Haven, Connecticut. Beka leads the design and implementation of ongoing projects at The Clark Art Institute in Williamstown, MA, and served as project landscape architect for the renewal and expansion that opened in 2014. She shepherded the design and implementation of the Old Quarry Residence in Guilford, Connecticut; and the Crystal Bridges Museum of American Art in Bentonville, Arkansas. Beka received the Charles Eliot Traveling Fellowship to research urban agriculture sites in South America, Africa, the Middle East, and Asia and serves as Visiting Assistant Professor of Art/Art History at Connecticut College.

LEARNING OBJECTIVES:

1.) Realize advancements in natural stone quarrying and fabrication that provide more cost effective products.

2.) Understand how material specifications influence cost and availability of natural stone materials.

3.) Relate Life Cycle Cost evaluation with its application to material selection.

4.) Compare relative sustainability characteristics of natural stone vs. competing products.

5.) Examine implementation of green technologies in the stone industry.
Stone and the Environment:

As a natural product, it is inherently earth-friendly. Natural stone currently offers many attractive, environmentally friendly attributes, including an enduring life-cycle, durability, ease of care and maintenance, recyclability, and quarry and manufacturing best practices.

Using natural stone shows that you take responsibility to care for the earth by actively striving to preserve, restore or improve the natural environment. Conserving resources, preventing pollution, and minimizing waste are some ways the stone industry is working to be eco-friendly through green building.

In its truest form, sustainability is a three-prong strategy involving environmental, social and economic requirements and that is how green building programs have been created. Construction materials must have an environmentally preferable profile over their life cycle, from raw material extraction through the use phase and finally at the end of its application.

Source: Natural Stone Council

Stone Quarries

The quarrying of stone didn’t change much in the 5,000 years since stone was quarried for the Great Pyramids. Until recently.

This 126 acre quarry in Elberton GA produces 1.3 million CF per year of Williams Blue Sky™ and Moonlit Rose®.
**Operating** a quarry involves 3 main activities.

All three have undergone major advances in the very recent past.

1  **Cutting**

Stone quarries, in particular granite quarries, have been transformed by the development of commercially available artificial diamonds.

Diamond drills and diamond wire have increased productivity and quality, and affordability.

2  **Handling**

Moving over burden and quarried stone for shipping and processing requires an investment in equipment and maintenance. A typical quarry block weighs 24 Tons. When choosing stone for your project, **go to the quarry**, see that the operation has the infrastructure, equipment, man power, and stone reserves to supply the job now and in the future.

3  **Transporting**

Getting granite blocks to a mill or factory to produce your product adds cost and carbon. Using stone from a quarry within 500 miles or 1500 miles by water or rail (REQMR5-01 Green Building Council), contributes to a LEED point for locally harvested material.
Fabrication

The same diamond wire that changed the way stone is quarried is used in the factory.

Modern fabrication plants utilize combinations of diamond wire saws, CNC contour saws, multi-wire slabbing saws, multi-axis bridge saws and CNC machining centers.

A quarrier fabricator can produce most any design you can imagine, Classic stone elements, paving, curb, planters, seats, and walls, can be blended with custom creations. Stone can be a classic backdrop or a centerpiece of your project

Recommendations

Use standard sizes, consider using solid stone, it is often superior and price competitive to veneer, choose repeated sizes that fit well into the stock.

Talk with a quarrier fabricator early in the process. Choose plentiful stone from a quarry that has the capacity to keep the project on track.
Supply Chain:

Material sourcing is from quarries and fabricators that produce to state; local and federal guidelines and that are compliant with OSHA, MSHA and other agencies rules and regulations, along with where possible, are producing to industry best practices and to a certified standard. In addition, when providing creative solutions to prospective end users, start with local/regional options and/or ones that are a better environmental alternative.

Codes, Standards and Voluntary Rating programs:

International Green Construction Code
http://newbuildings.org/international-green-construction-code
(IgCC)

- First sustainability CODE in the United States
- A member of the family of I –Codes
- Published and ready for jurisdictional adoption – revised and updated for 2015
- IGCC & Stone:

CHAPTER 5: MATERIAL RESOURCE CONSERVATION AND EFFICIENCY

502 Construction Materials and Waste Management
- Re-use / Recyclability
503.2 Material Selection
503.2.1 Used Materials
- Re-use / Recyclability
503.2.2 Recycled Materials
503.2.3 Recyclable Building Materials
503.2.5 Indigenous Materials
- Local Materials

CHAPTER 6: ENERGY
- Passive Solar Thermal Storage

CHAPTER 10: EXISTING BUILDINGS
- Alterations to Existing Buildings

CHAPTER 11: EXISTING SITES
- Alterations to Existing Sites
- POSSIBLE FUTURE ELEMENTS IN THE DEVELOPMENT OF THE CODE
- LCA – Life Cycle Analysis
- Design Life
- Building Service Life
- Chain of Custody
LEED V4:

Sustainable sites
http://www.usgbc.org/v4

Credit 5  Heat Island Reduction
- Option 1: Non-roof Measures

ENERGY & ATMOSPHERE:
Credit 2  Optimize Energy Performance
- Option 1. Whole-building energy simulation
- Option 2. Prescriptive compliance

MATERIALS & RESOURCES
Credit 1 Building Life-Cycle Impact Reduction
- Option 1. Historic Building Reuse
- Option 2. Renovation of Abandoned or Blighted Building
- Option 3. Building and material reuse

Building Product Disclosure & Optimization
Credit 2  Environmental Product Declarations (EPD)
- Option 1. Environmental Product Declaration
- Option 2. Multi-attribute Optimization

Credit 3 Sourcing of Raw Materials
- Option 1. Raw Material Source & Extraction Reporting
- Option 2. Leadership Extraction Practices

Credit 4  Material Ingredients
- Option 1. Material Ingredient Reporting
- Option 2: Material Ingredient Optimization
- Option 3: Product Manufacturer Supply Chain Optimization

Credit 5  Construction & Demolition Waste Management
- Option 1. Diversion
- Option 2. Reduction of Total Waste Material

Additional LEED Categories
Integrative Process
- Energy-related Systems and Water-related Systems

Innovation
- Contribute to life-cycle cost, durability, mold resistance, improved air quality beyond requirements
Understanding LEED v4 How can your stone contribute to LEED

Natural Stone Characteristics:

- Durable over time
- Weather Resistant
- Does not off-gas
- Fire/Heat resistant
- Abrasion resistant
- Chemically resistant
- Low absorption rates
- Requires little to no maintenance
- Cost-effective over the life cycle
- Very versatile material
- Available regionally
- Salvageable and Recyclable

Source: Stephanie Vierra, Assoc. AIA, LEED AP BD + C President, Vierra Design & Education Services, LLC

- ANSI-based standard development process
- Standard establishes criteria for stone produced in a preferable manner
  - Not intended to determine which stone type is better
  - Similar to FSC, defines leadership quarrying and production practices
- Multi-attribute, life-cycle based standard
  - Environmental
  - Human health
  - Social sustainability
- International scope-ISO process

How certification works:
- Categories
- Energy
- Water
- Transportation
- Site management
- Land reclamation and adaptive reuse
- Management of excess process materials and waste
- Corporate governance
- Safer chemical and materials management
- Human health and safety

Bronze certification Silver (8+ optional) Gold (+15 optional) Platinum (+22 optional)
http://naturalstonecouncil.org/education-training/nsc-initiatives/dimensional-stone-standard/
DESIGN

1 Context and Substrate
2 What can be salvaged? What can be introduced?
3 What material expression and performance suits the project?
4 Controlling expression and costs.
5 Collaborating with suppliers, quarries, and masons.
6 Weathering and use