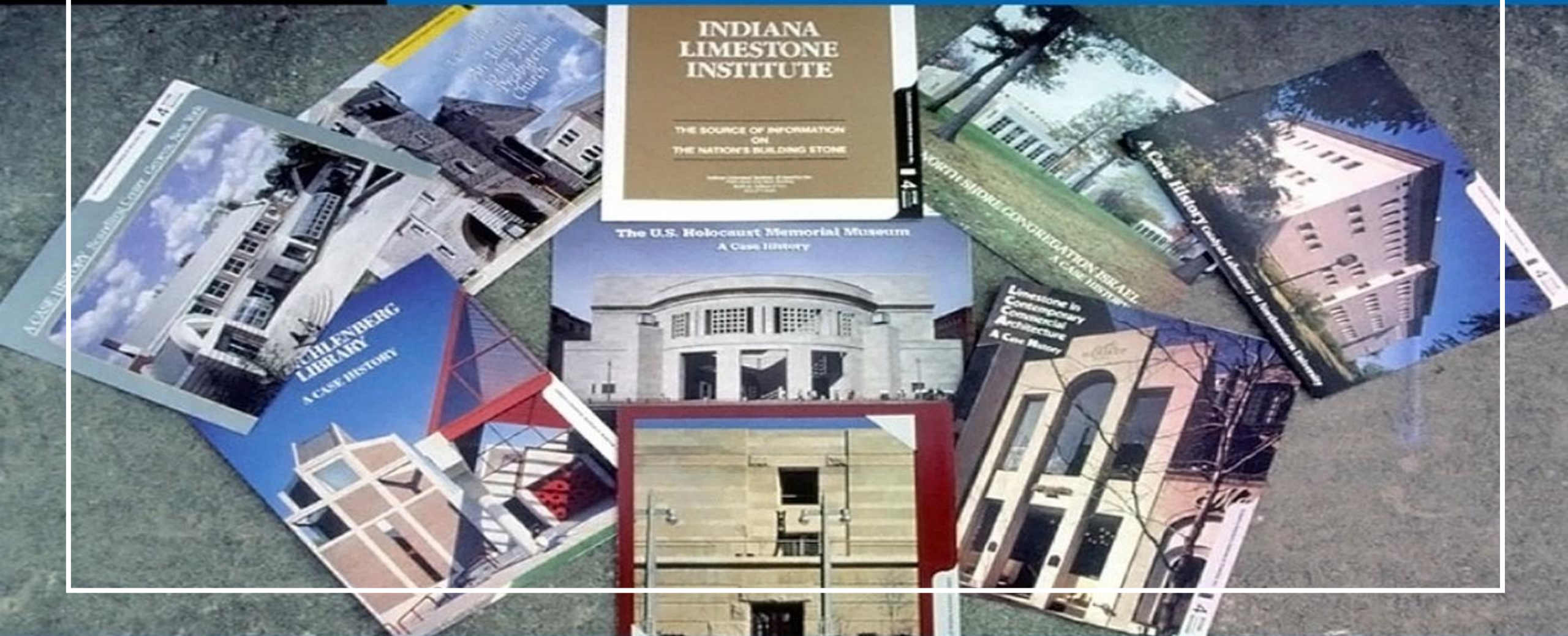
Designing with Indiana Limestone

Presenter: Kurt Sendek

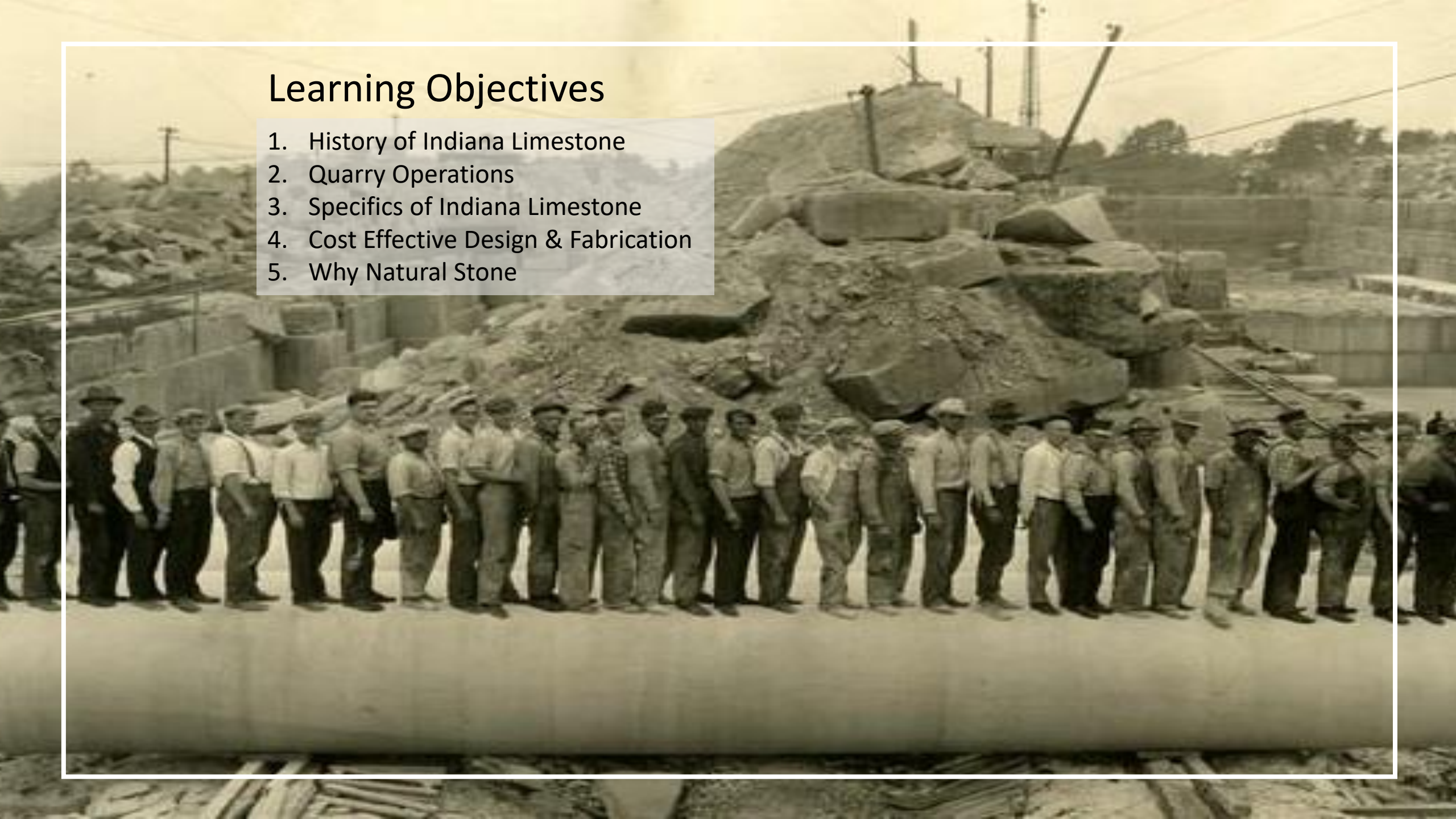
Business Established in 1992
52,000 square foot fabrication facility
Produces 130,000 cubic feet of custom cut Indiana Limestone per year
Purchased in 2015 by Lily & Kurt Sendek

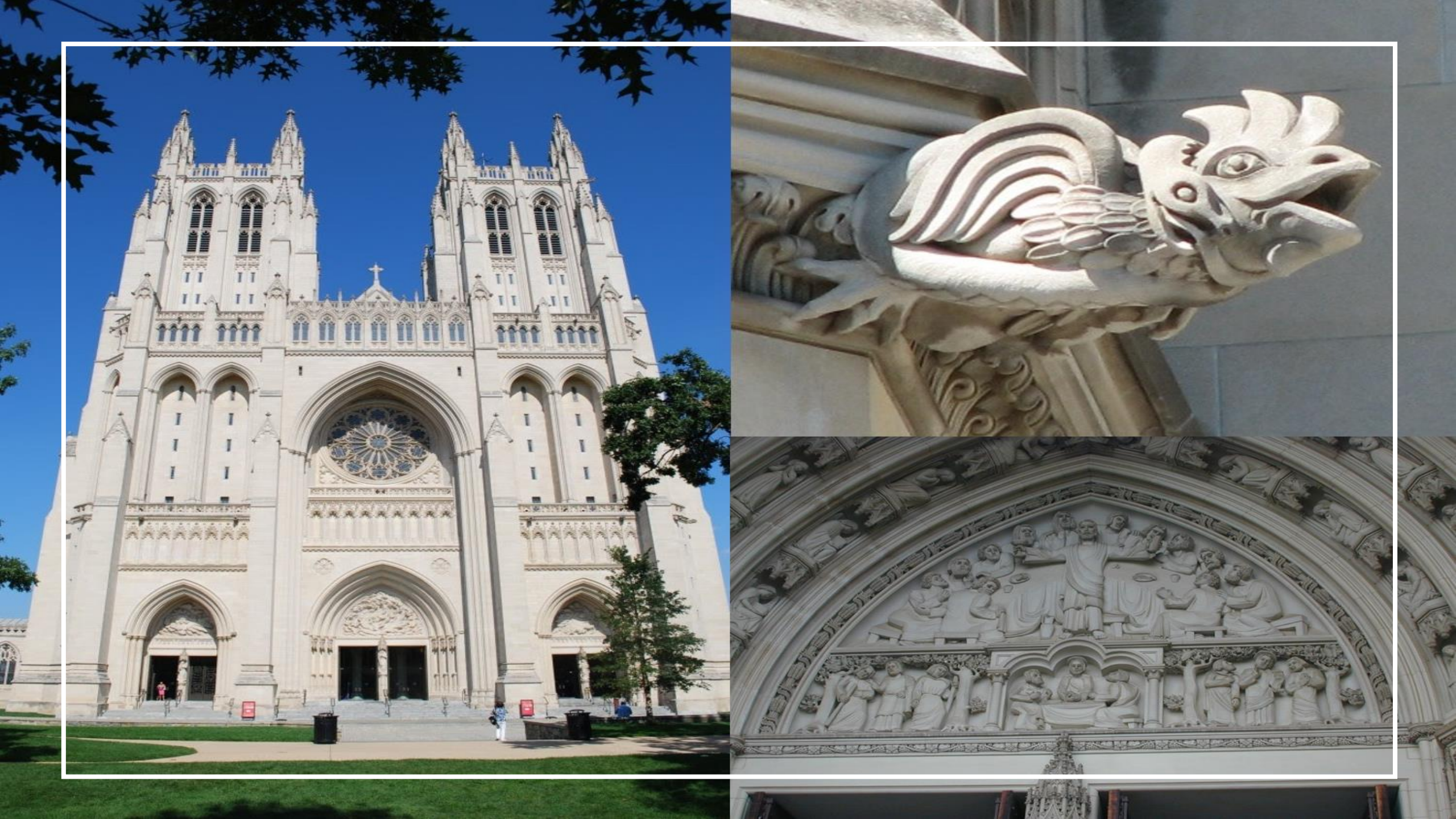
Indiana Limestone Institute



Learning Objectives

1. History of Indiana Limestone
2. Quarry Operations
3. Specifics of Indiana Limestone
4. Cost Effective Design & Fabrication
5. Why Natural Stone






BRAUER


SPEA


NELSON
HALL


YANKEE STADIUM
YANKEE STADIUM
GATE 4

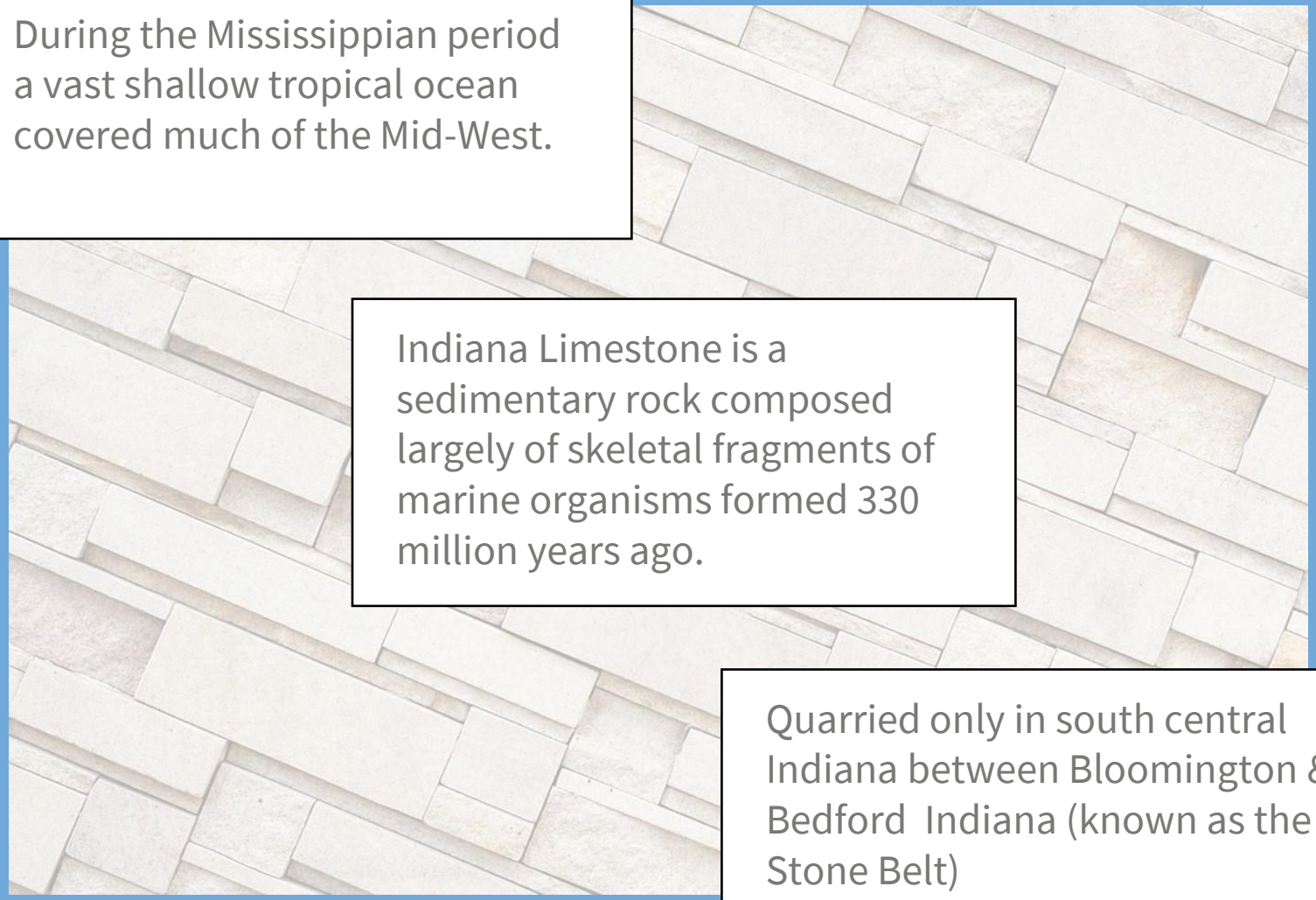

INDIANA STATE MUSEUM
INDIANA STATE MUSEUM


OLD NATIONAL
BANK

1. History of Indiana Limestone

What is Indiana Limestone

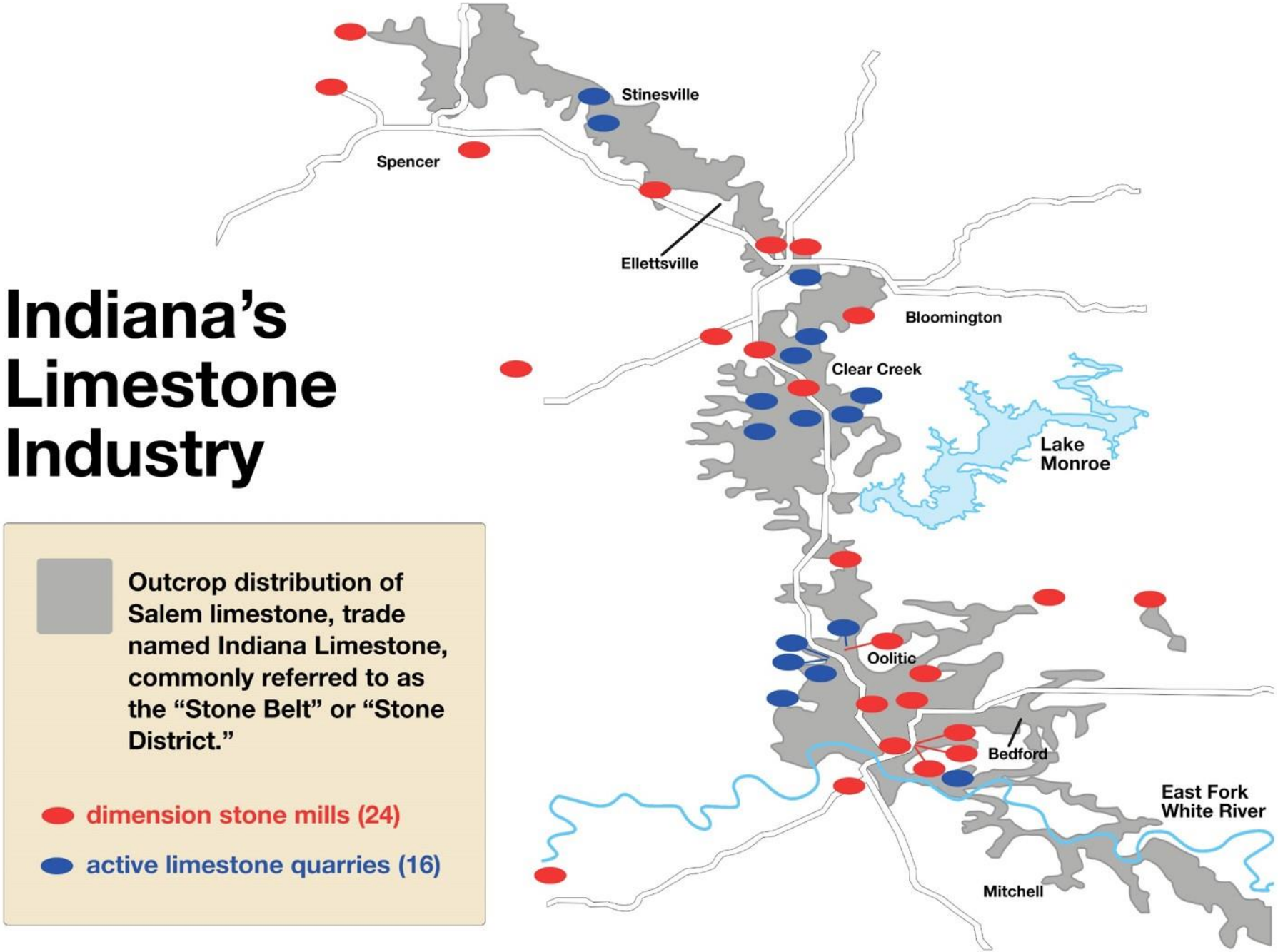
During the Mississippian period a vast shallow tropical ocean covered much of the Mid-West.



Indiana Limestone is a sedimentary rock composed largely of skeletal fragments of marine organisms formed 330 million years ago.

Quarried only in south central Indiana between Bloomington & Bedford Indiana (known as the Stone Belt)

Indiana's Limestone Industry



Outcrop distribution of Salem limestone, trade named Indiana Limestone, commonly referred to as the "Stone Belt" or "Stone District."

- dimension stone mills (24)
- active limestone quarries (16)

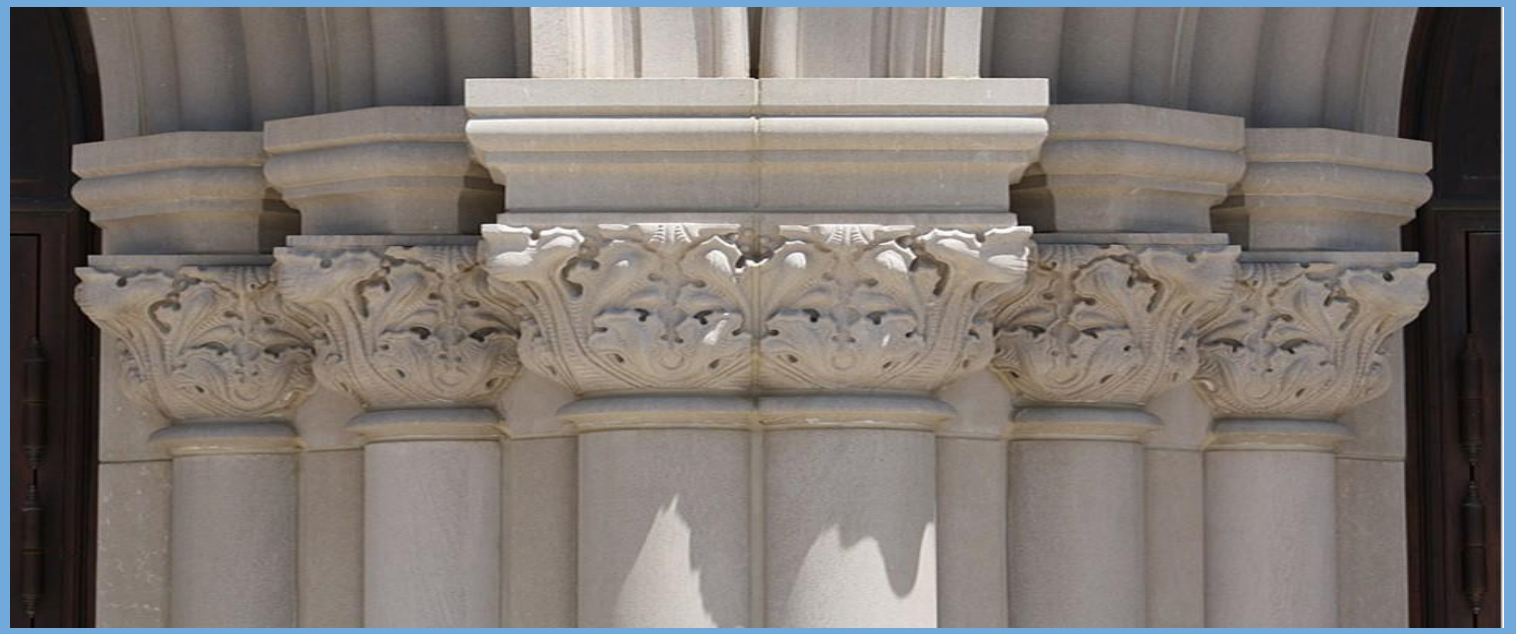
Localized Industry

Maxwell Hall at Indiana University, Bloomington, Indiana was originally called the Library Hall, which was constructed in 1890. The building was renamed Maxwell Hall in 1894.

Global Industry

Vintners Place – London, England

Supply Reserves



The supply of Indiana Limestone is virtually unlimited. Geologists estimate that the product will be available for 500 – 600 years based on present extraction methods. A trend to underground quarrying would extend the supply to more than 1,000 years. Indiana Limestone is as close to an inexhaustible resource as exists on earth.

2. Quarry Operations


Soil and Waste Limestone Overburden
St. Louis Limestone
Soft Aggregate Layer
DOT Spec Aggregate Layer
Soft Waste Layer
Bench 1
Bench 2
Bench 3
Bench 4
Salem Limestone
Bench 5
Below Water

Quarry Bench

Quarry Saw

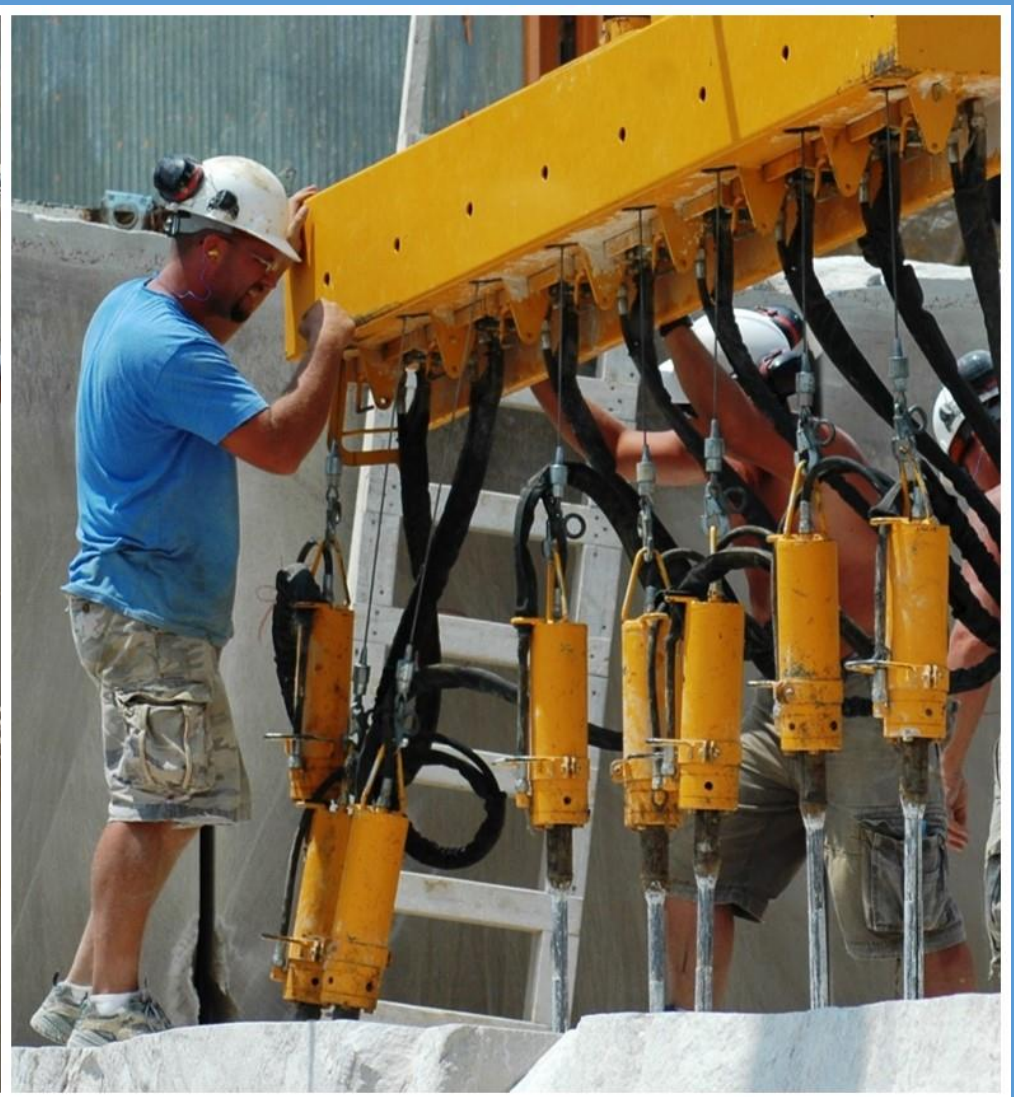
Ledge Seperation


Ledge Turn

Block Nesting - Old


Block Yard - Old

Block Nesting – New




Block Yard - New

3. Specifics of Indiana Limestone

Indiana Limestone

Colors

Buff

Gray

Variegated

Grades

Select

Standard

Rustic

ASTM Test Data Comparison

Product	ASTM Test	Compressive Strength (PSI)	Air Content Range	Absorption	Freeze/Thaw
Indiana Limestone	C-568	Min. 4000	N/A	7.5% Max.	N/A
Cast – VDT	C-1364	Min. 6500	N/A	6% Max.	5% at 300 Cycles
Cast - Wet	C-1364	Min. 6500	4% - 8%	6% Max.	5% at 300 Cycles

Indiana Limestone Test Data Actuals
Compressive Strength - 7000+ PSI
Absorption – 4% - 5%

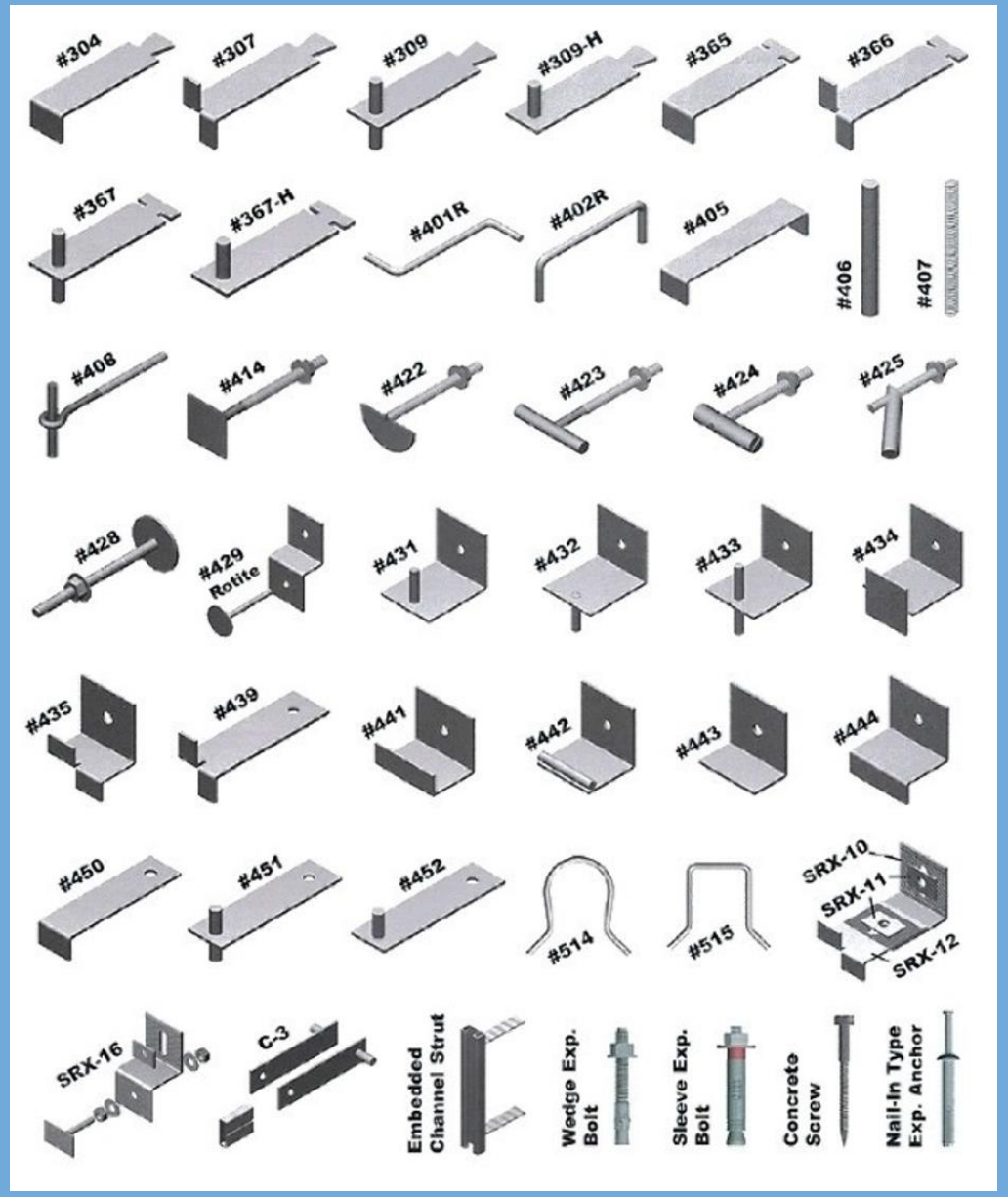
Composition / Information on Ingredients

Name	Product Identifier	%	GHS-US Classification
Calcium Carbonite (main constituent)	CAS No. 471-34-1	99.36%	Skin Irrit. 2 H316 Eye Irrit. 2B H320 STOR SE 3 H335
Magnesium Oxide	CAS No. 1309-48-4	0.64%	
Silica	CAS No. 14808-60-7	Non Detect	N/A

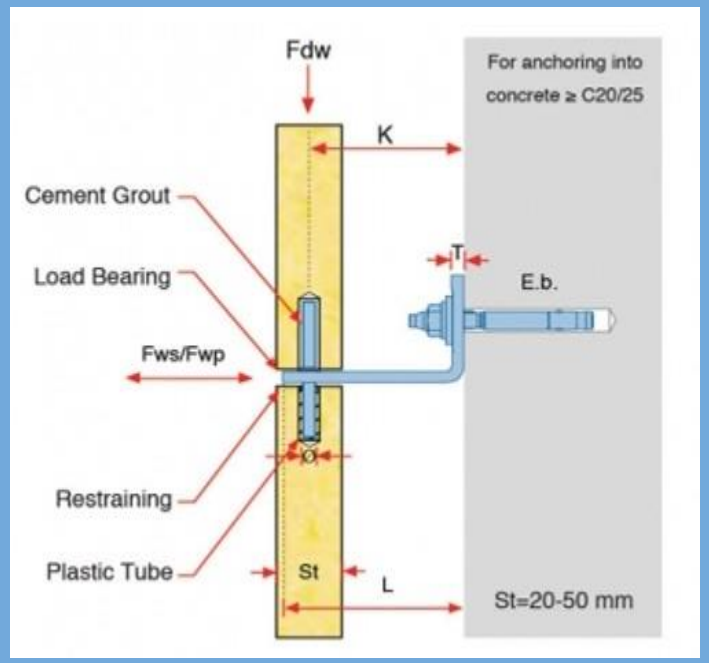
Non-presence of Silica (CAS No. 14808-60-7, Cristobalite, Quartz, Tridymite) determined according to NIOSH 7500 Analytical Method.

Anchor Selection

- Wind Load
- Seismic Load
- Control Joints
- Materials Selection
- Openings in Structure
- Mortar Selection
- Insulation Thickness



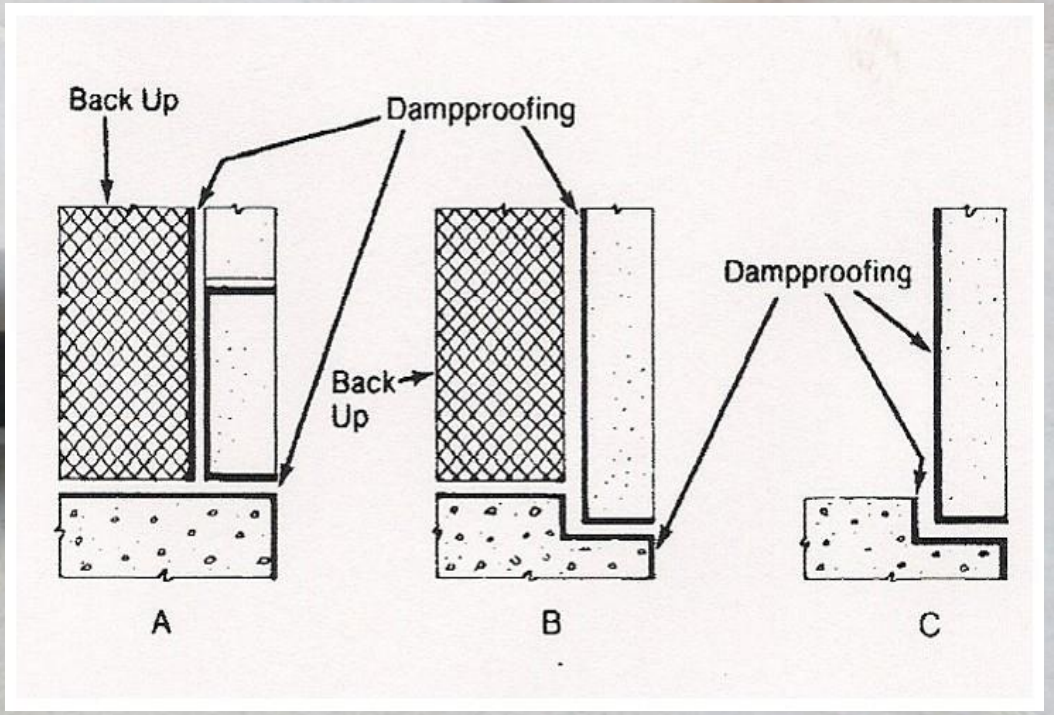
Anchor Selection



Maintenance and Cleaning

Field Modifications

Damp Proofing



4. Cost Effective Design & Fabrication

15 Central Park West

2014 Tucker Design Award
Architect: Robert A.M. Stern

Stone: Indiana Limestone Full Color Blend

Fifteen Central Park West is completely clad in limestone, complementing the light-toned brick and stone of the older towers and contrasting with the dark reflections of the newer buildings around Columbus Circle. The warmth and natural variation of limestone has made it the material of choice for New York's most important buildings, those with the highest architectural ambitions, from the Metropolitan Museum of Art to the Frick Museum to the Empire State Building to some of the great apartment houses like 998 Fifth Avenue and 740 Park Avenue; no material takes the light more beautifully.

V House

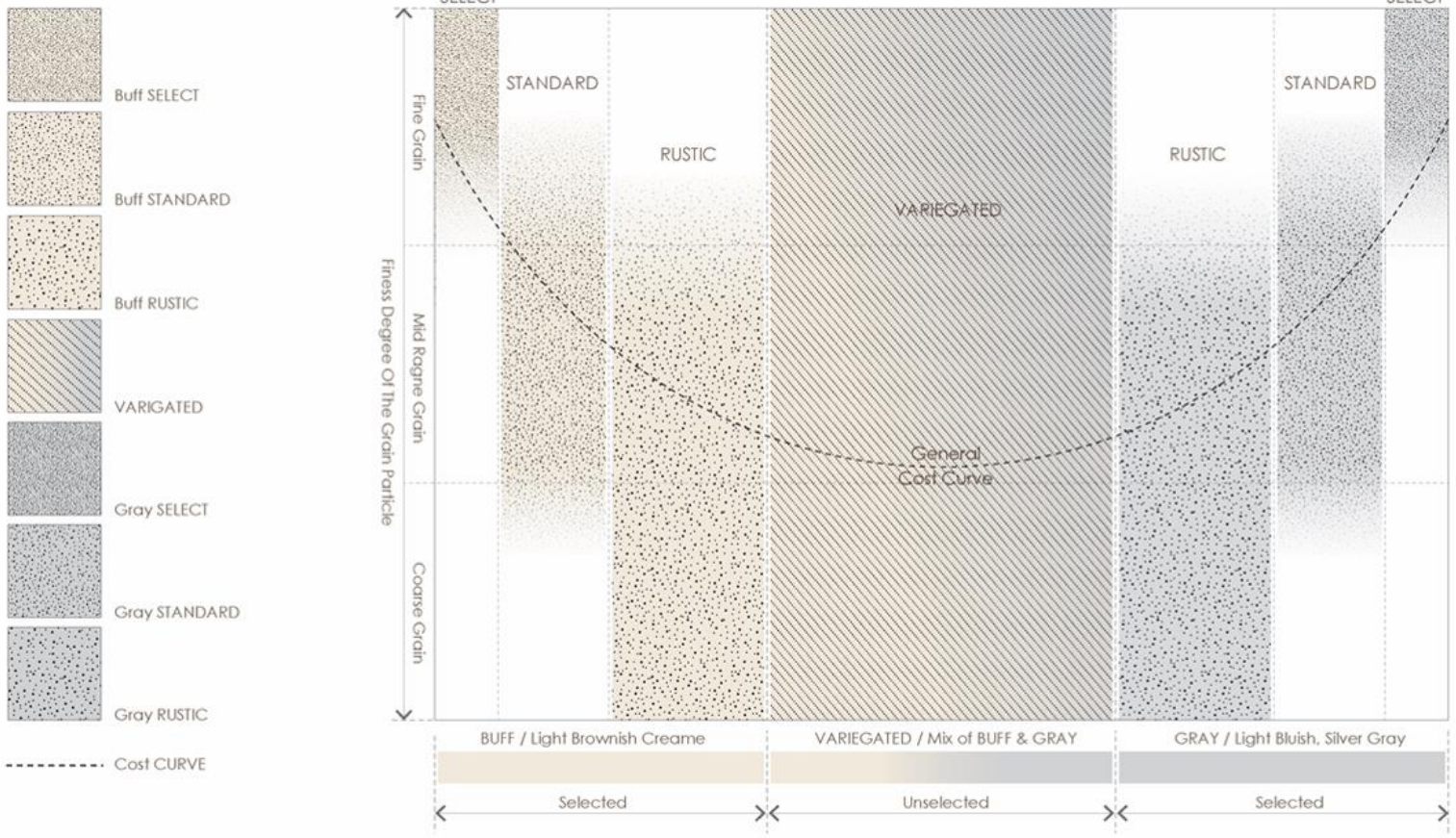
2017 Pinnacle Award
Architect:
Dagliesh Gilpin Paxton

Stone:
Indiana Limestone Rustic Buff

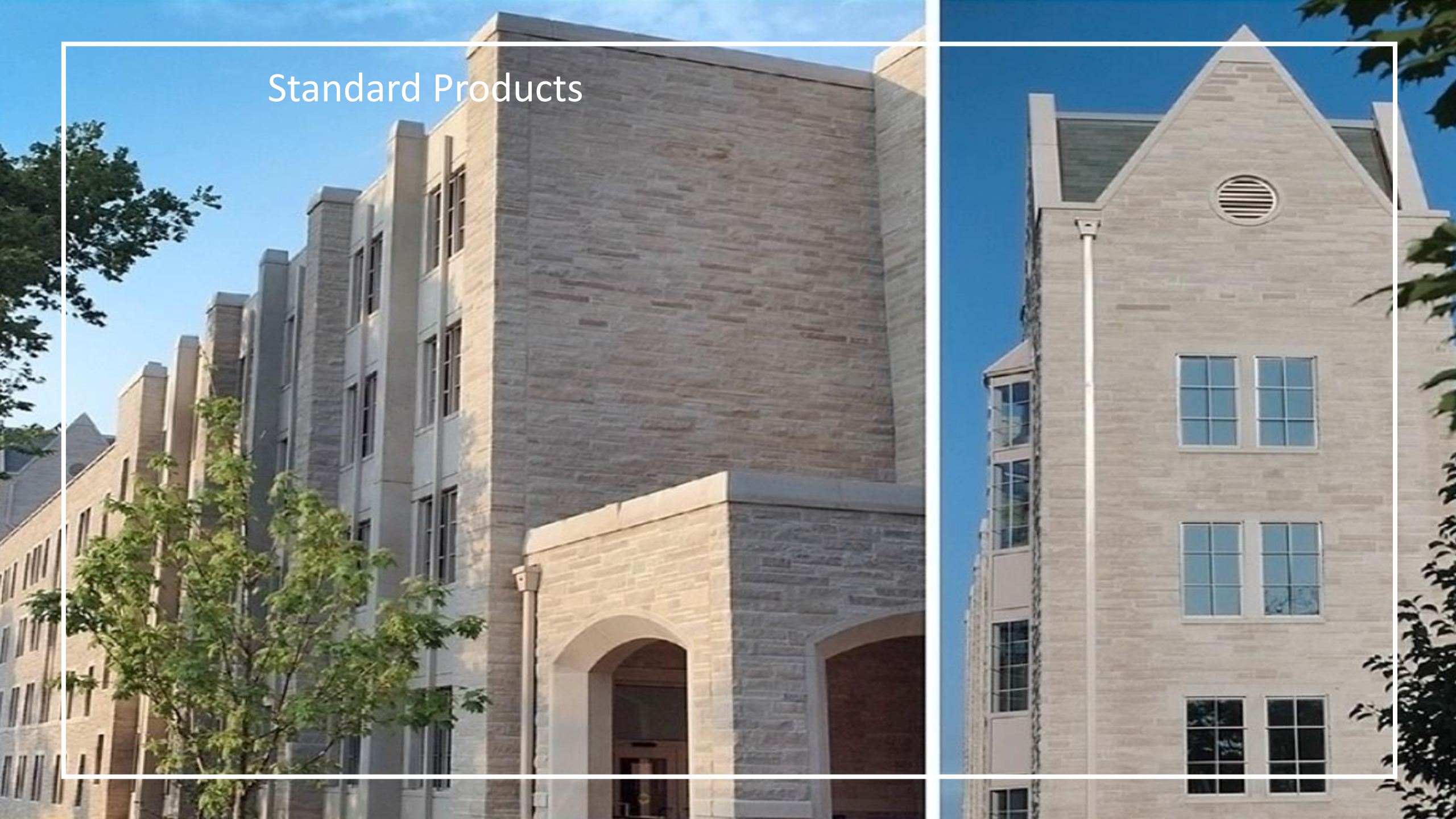
The V House is a classically inspired Palladian villa; it was the owners desire to have a structure designed for energy efficiency and sustainability, with minimal maintenance. The use on natural stone was instrumental in achieving the owners requirements.

The classically designed entablatures, pediments, window and door surrounds, columns and mantels all utilized Indiana Limestone.

Cost Curve



Standard Products



Standard Products

Standard Products

Standardized Sizes

Standardized Sizes

Standardized Sizes

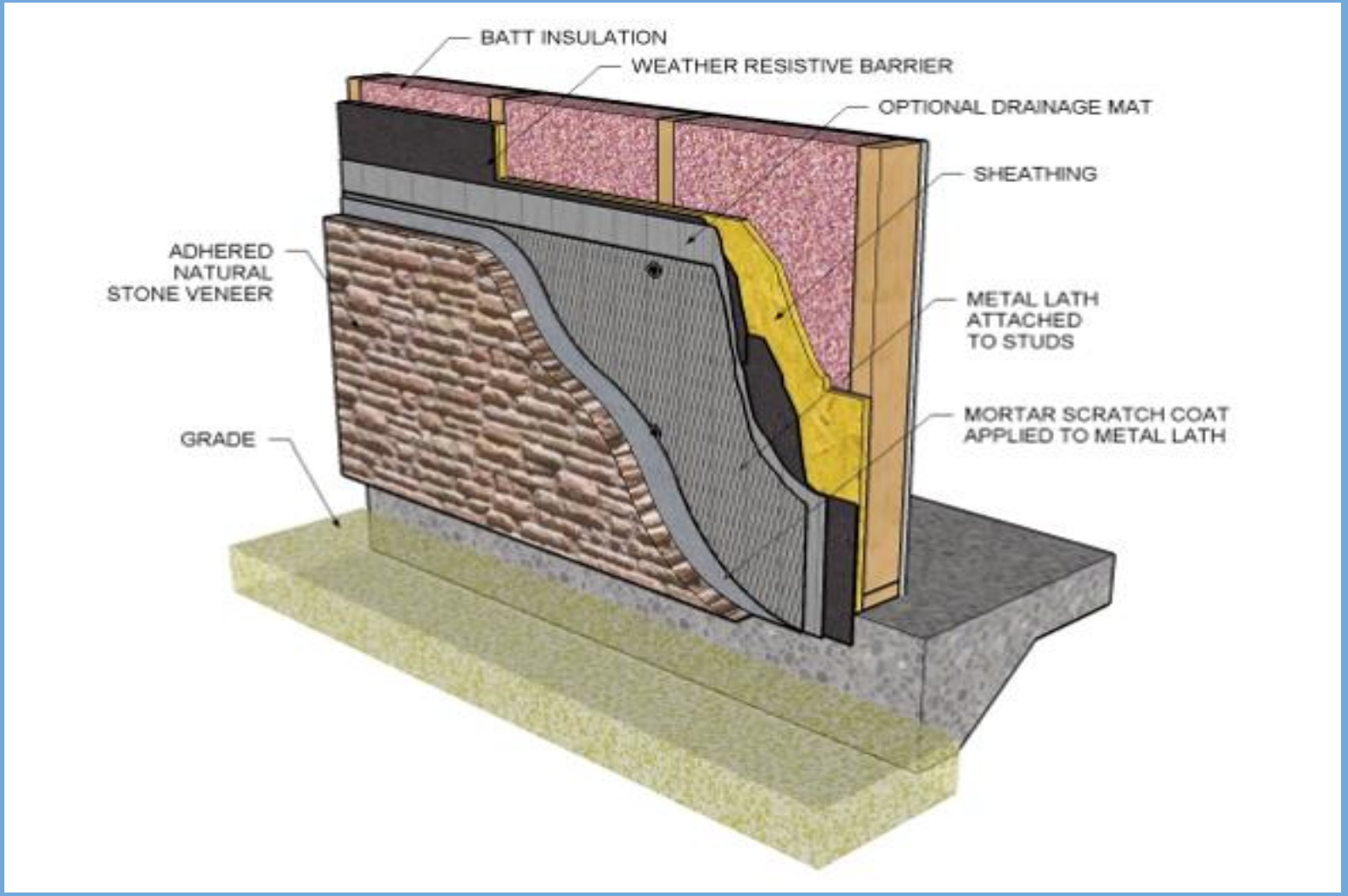

Standardized Flat


A3
Standardized Flat

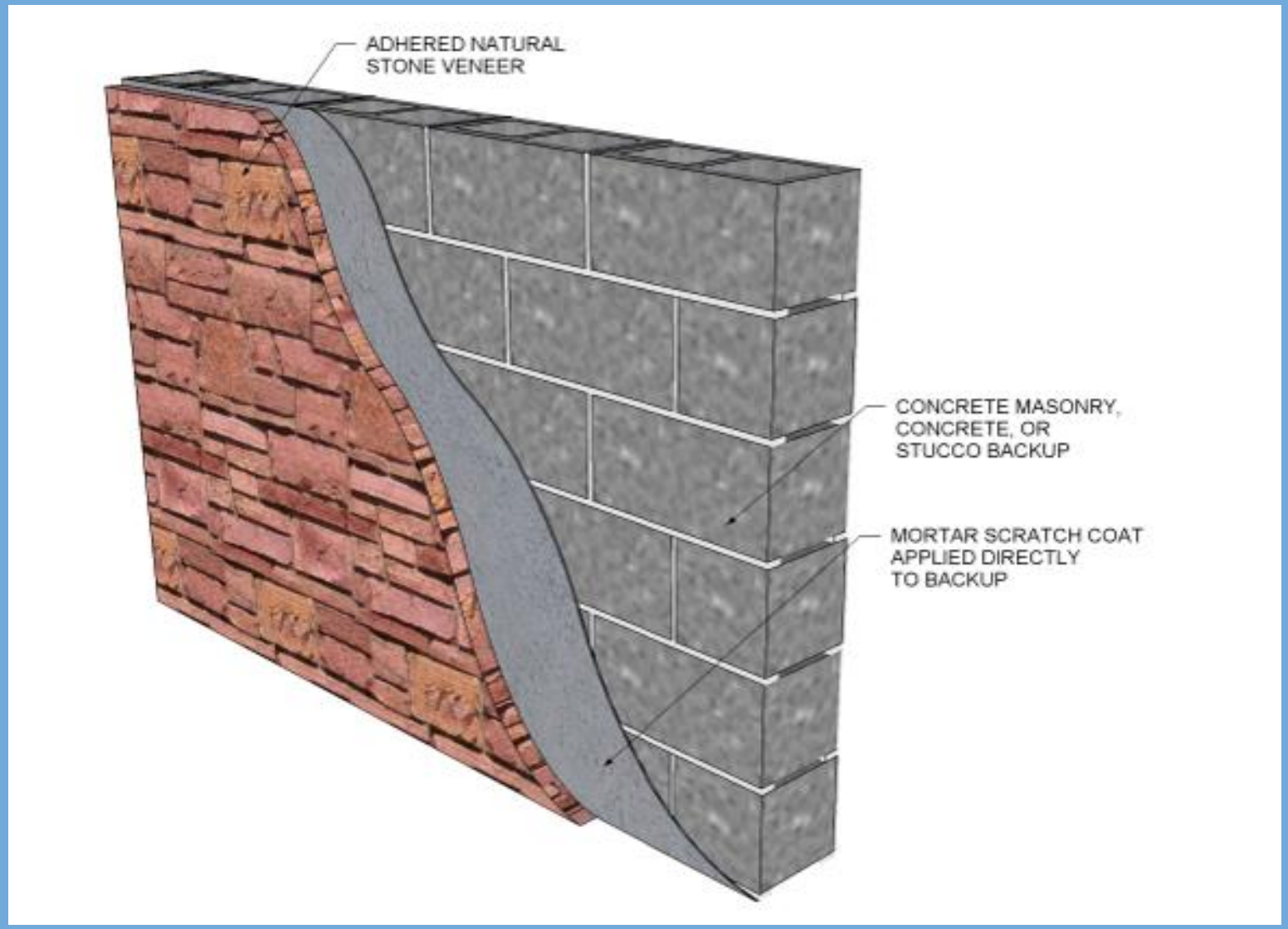
Mass Production


Thin Veneer

Thin Veneer


BATT INSULATION
WEATHER RESISTIVE BARRIER
OPTIONAL DRAINAGE MAT
SHEATHING
ADHERED
NATURAL
STONE VENEER
METAL LATH
ATTACHED
TO STUDS
MORTAR SCRATCH COAT
APPLIED TO METAL LATH
GRADE

Thin Veneer


ADHERED NATURAL
STONE VENEER
CONCRETE MASONRY,
CONCRETE, OR
STUCCO BACKUP
MORTAR SCRATCH COAT
APPLIED DIRECTLY
TO BACKUP

Restoration

LEED

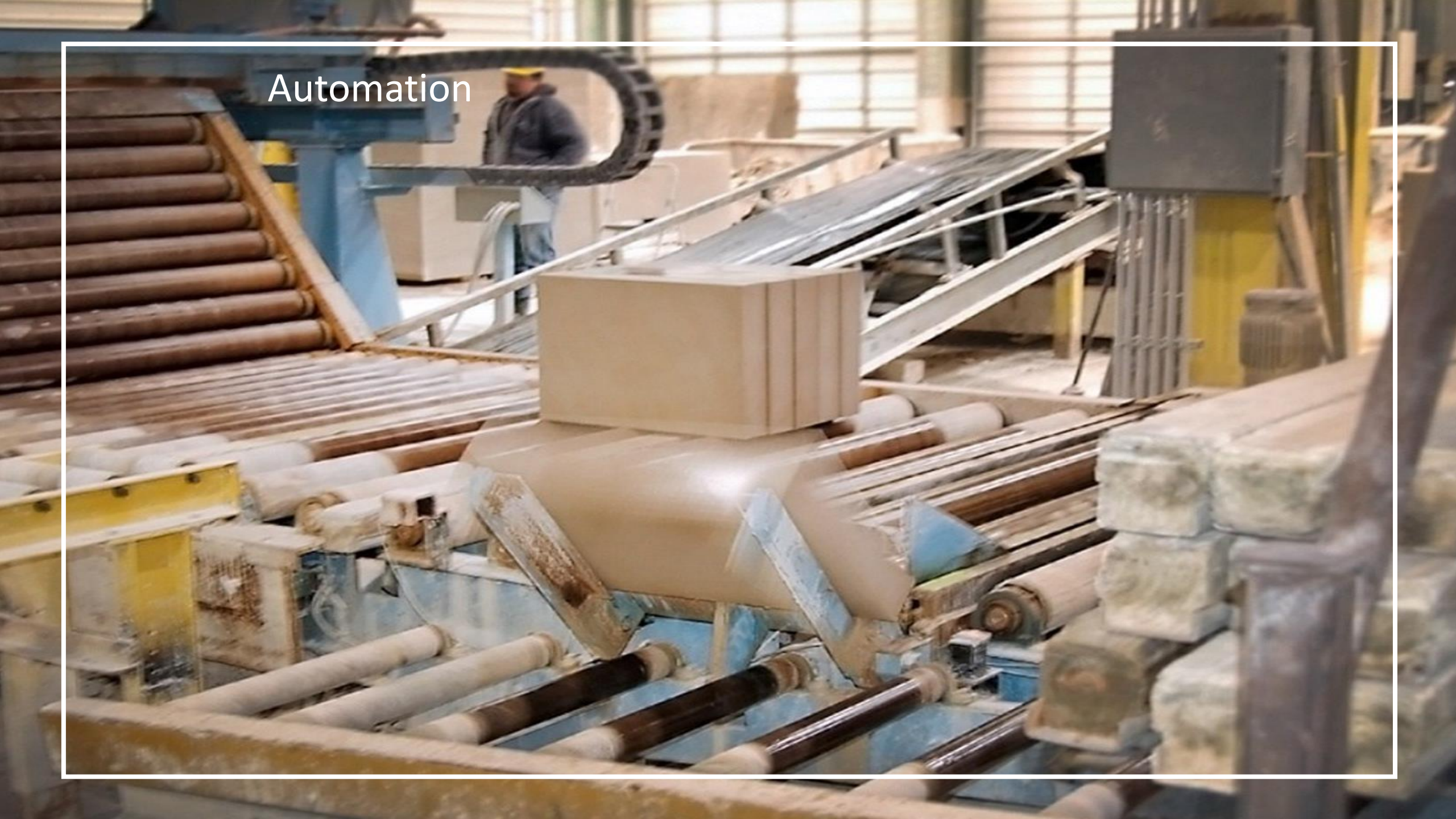
- Leadership in Energy & Environmental Design (LEED) - Credits
  - MR Credits 1.1&1.2: Building Reuse, Maintain 75-95% of Existing Walls, Floors, and Roof
  - MR Credits 2.1&2.2: Construction Waste Management, Divert 50-75% from Disposal
  - MR Credits 3.1&3.2: Materials Reuse, 5-10%
  - MR Credits 5.1&5.2: Regional Materials
  - ID Credit 1: Innovative Design
  - LEED Canada Credit 8: Durable Building
  - SS Credit 7.1: Heat Island Effect, Non-Roof
  - EA Credit 1: Optimize Energy Performance

- Indiana Limestone is very environmentally friendly, nearly every process in the plant uses recycled water. No acids, additives or coloring is required.


Cost Effective Fabrication

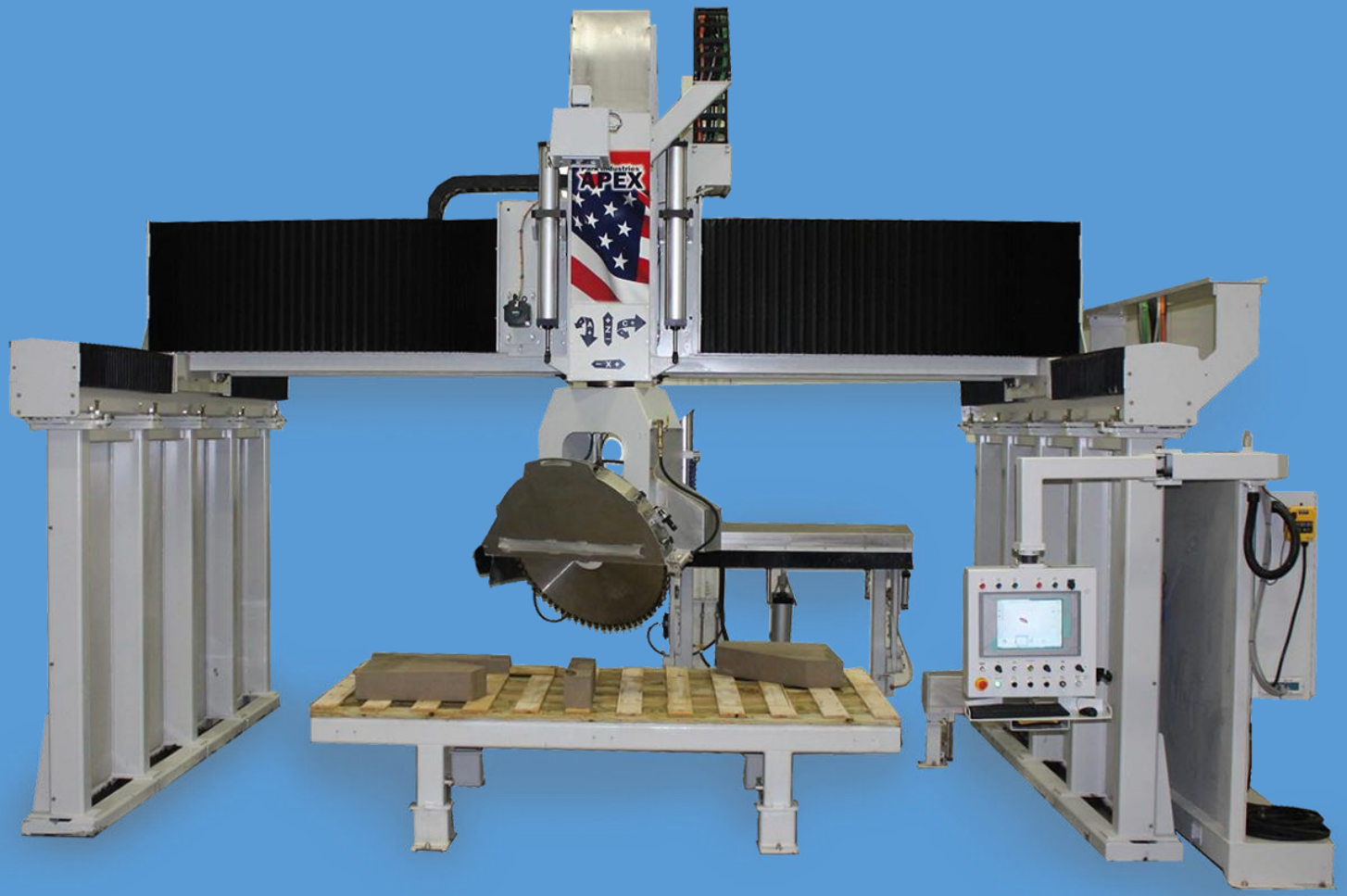
Cost Effective
Fabrication

Multi-Saws

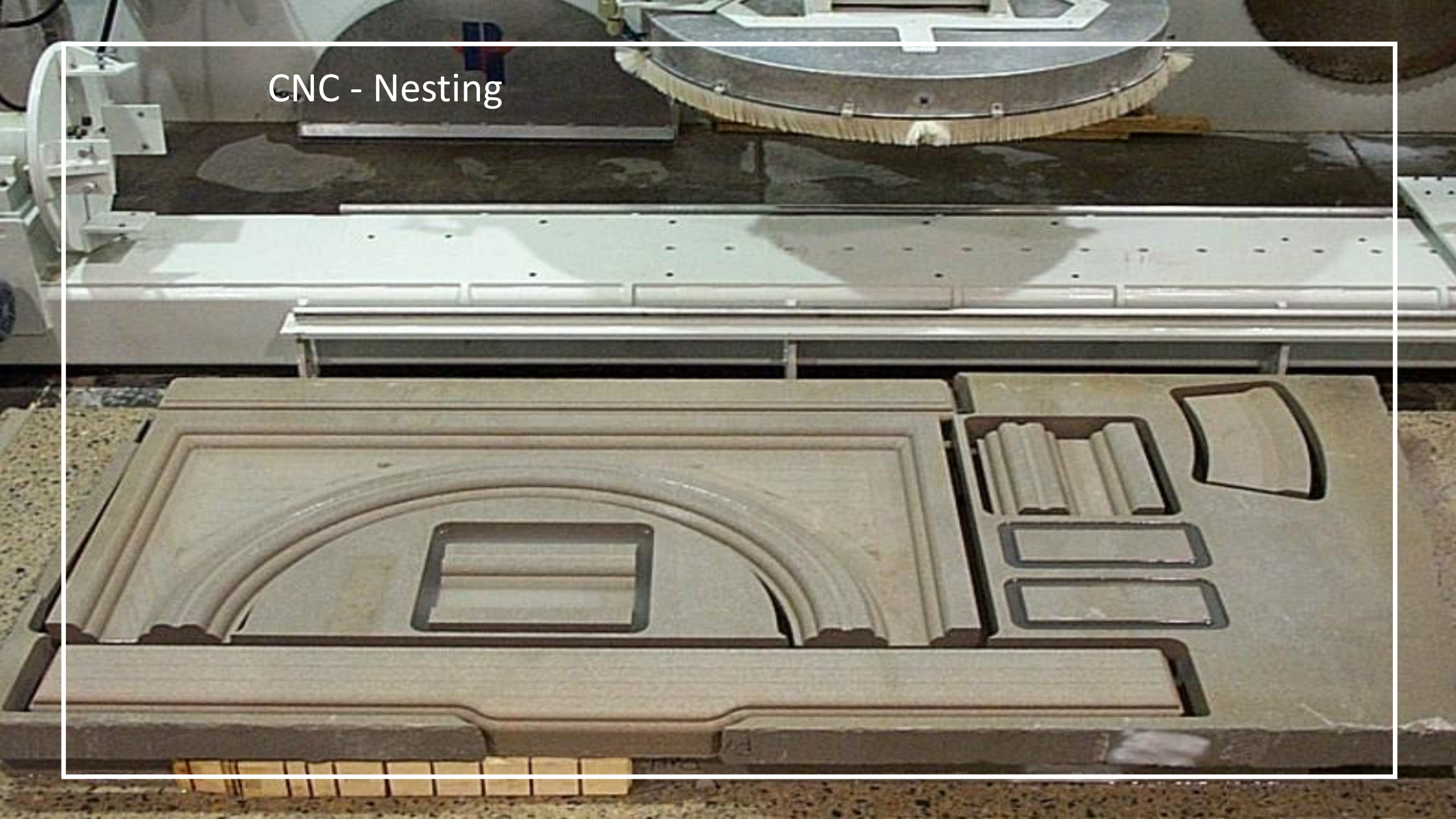

Automation

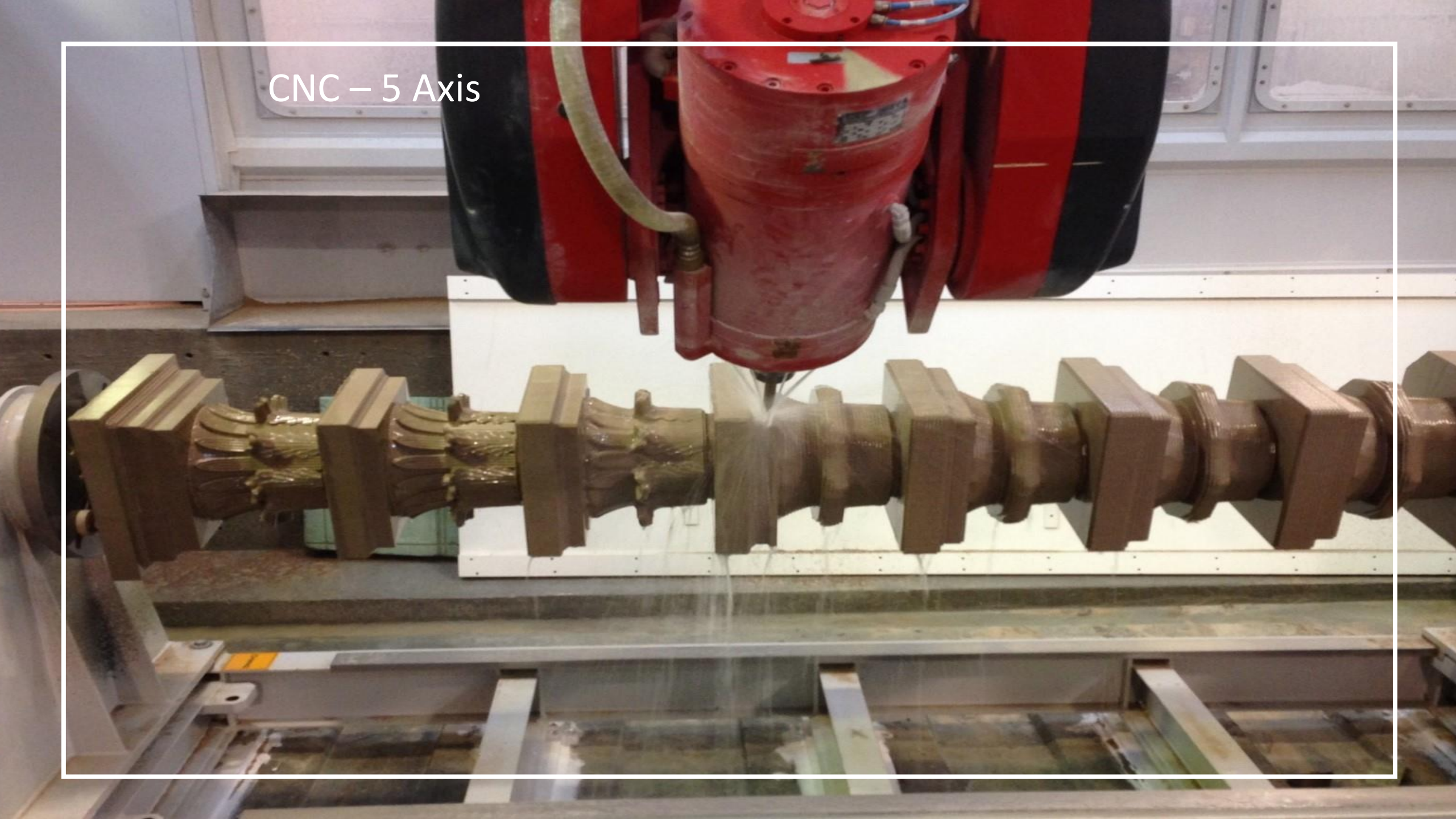

Robotics

CNC



CNC - Nesting




CNC – 5 Axis

CNC Stock Removal


CNC Line

5. Why Natural Stone


Aesthetics


Proven Performance

Des Moines Iowa 1871

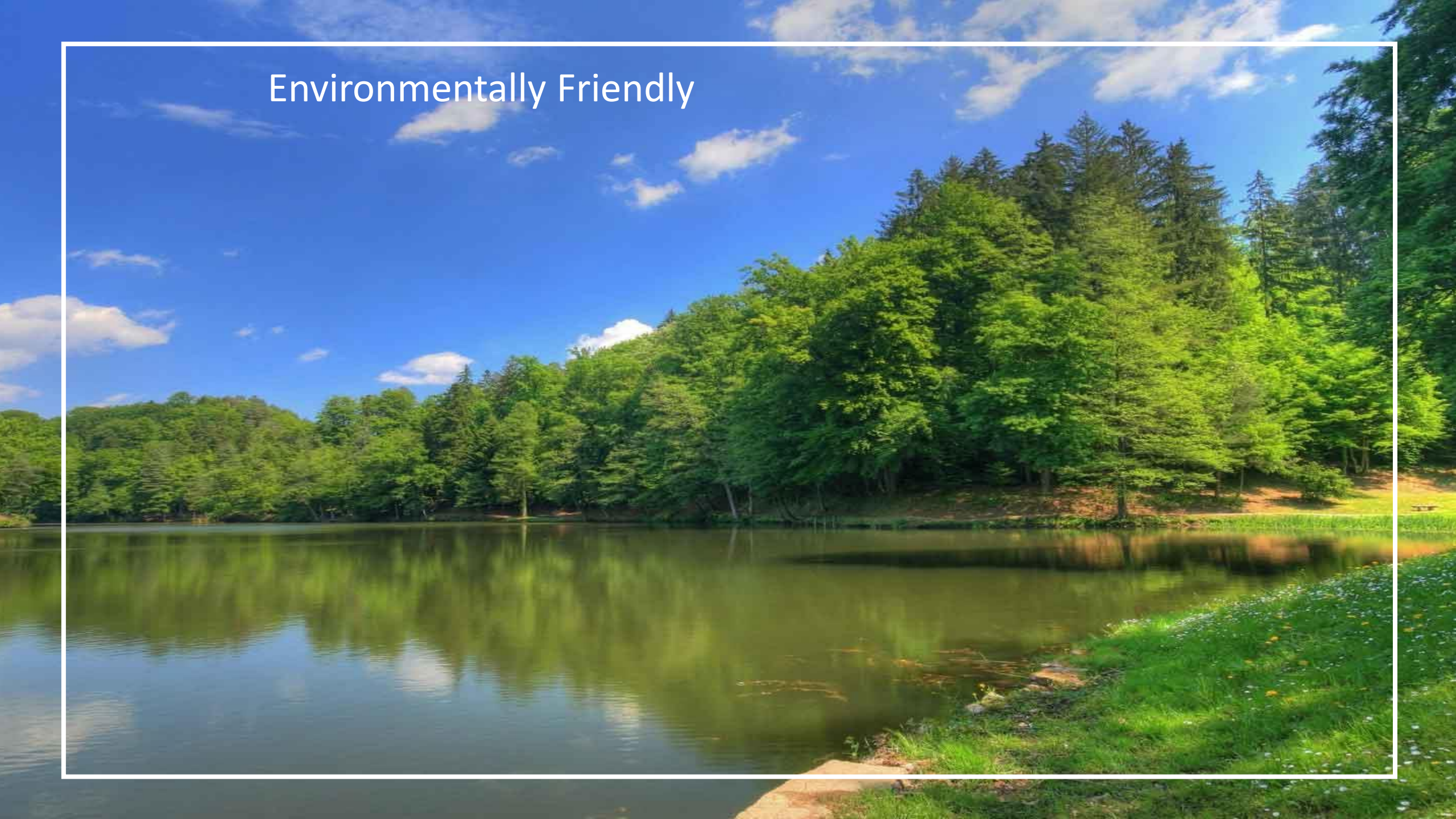
Indianapolis Indiana 1888

Atlanta Georgia 1889

Little Rock Arkansas 1899

Frankfort Kentucky 1900

Environmentally Friendly



Questions

Ventilated Facade Systems: Versatility, Creativity & Resiliency

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