SECOND PLACE WINNER OF THE NEXT GENERATION CATEGORY 2017
LAFARGEHOLCIM NEXT GENERATION AWARDS (MIDDLE EAST AND AFRICA)

CANDIDATE TO RECEIVE THE RESEARCH IN PRACTICE GRANT

RECOVERING ALEPPO’S TOPOGRAPHY
A CATALYTIC STRATEGY FOR RECYCLING DEMOLITION WASTE
AND CONTINUED CIVIC ENGAGEMENT POST DISASTER

PROJECT BY NOUR MADI (ME. CIVIL ENGINEERING)
GHAAFTH ABI GHANEM / JAD MELKI (GHAAFTH & JAD ARCHITECTURE AND DESIGN STUDIO)
<table>
<thead>
<tr>
<th>Location</th>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beirut, Lebanon _ Sep 2015</td>
<td>AUB Master Thesis in Civil Engineering: A GIS-Based Framework for Managing Construction and Demolition Waste: The Case of Syria. Ms. Nour Madi / Civil Engineer</td>
</tr>
<tr>
<td>Detroit, USA _ Apr 2016</td>
<td>Infrastructure Space: 5th International LafargeHolcim Awards for Sustainable Design. Selected as Second Place Winning Project for Student Poster Competition.</td>
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<tr>
<td>Stuttgart, Germany _ Jun 2016</td>
<td>IUSD Lab “Scenarios for Post-War Reconstruction in Aleppo” Workshop. University of Stuttgart</td>
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<tr>
<td>Beirut, Lebanon _ Jan 2017</td>
<td>Architects on Project: GhaithsJad Architecture and Design. Mr. Ghaith Abi Ghanem, Mr. Jad Melki</td>
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<tr>
<td>Nairobi, Kenya _ Sep 2017</td>
<td>LafargeHolcim Next Generation Awards (Middle East and Africa). Selected as Second Place Winner of the Next Generation Category 2017</td>
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<tr>
<td>Beirut, Lebanon _ Jun 2018</td>
<td>Beirut Design Week 2018: Forum on Cities and Designers</td>
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<tr>
<td>Guimaraes, Portugal _ Jul 22</td>
<td>Rebuilding Syria from Within: Summer School Workshop</td>
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<tr>
<td>Mexico City, Mexico _ Sep 2018</td>
<td>Winners: Next Generation Lab</td>
</tr>
<tr>
<td>Beirut, Lebanon _ 2019</td>
<td>Research in Practice Grant: Local Market Research on Introducing Recycled Concrete Aggregate Product in Lebanon</td>
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Main Advisors:
- Dr. Issam Sour / Associate Professor in Civil and Environmental Engineering
- Dr. Ibrahim Alameddine / Environmental and Water Resource Engineering
- Mr. Aram Yeretzian / Joint Position for Climate Responsive Buildings

LaFarge Holcim Foundation Award Jury:
- Marc Angélique / Switzerland
- Joe Osae-Addo / Ghana
- Meisa Batayneh Maani / Jordan
- Nagra Sherif / Egypt, Head of Jury
- Mohsen Ech / Lebanon/France
- Howayda Alharthy / Lebanon
- Fasil Giorghis / Ethiopia
- Kunle Adeyemi / Nigeria
- Christina Du Plessis / South Africa

Feedback and Insight:
- Dr. Philippe Chite / Lead Expert - Reconstruction and Economic Recovery
- Strategic Policy and Programme Units (ESCA)
- Mr. Sinan Hassan / Architect
- Mr. Samuel Bonnet / IRC Head of Construction Water and Habitat
- Dr. Omar ABDULAZIZ HALLAJ / CEO of Syria Trust for Development (Non-Governmental Foundation Providing a Framework for a Variety of Community-Based Developmental Initial in Syria)
- Dr. Abdul Razzaq Moaz / Co-Director of ASOR (American School of Oriental Research) Syrian Cultural Heritage Initiatives
- Dr. Samir Kanafani / Anthropologist
- Dr. Houwayda Al Harthy / Professor of Architecture AUB
- Dr. Adrian Zakar / Historian
- Azza Abo Rebiieh / Illustrator
- Sari Moustafa / Writer and Actor
- Hashem Aqani / Acting and Producer
- Balsam Madi / Architect, Director of Blatt Boutique

Portugal Workshop in Participation with:
- Global Platform for Syrian Students
- Universidade do Minho
- Universita IUAV di Venezia
- United Nations Economic and Social Comission for Western Asia
ENVIRONMENT
THE ILLEGAL DUMPING OF DEMOLITION WASTE INCREASES THE AMOUNT OF QUARRYING (CASE OF LEBANON 2006)

SITUATION
(GIS BASED FRAMEWORK) MULTI-CRITERIA EVALUATION:
PROXIMITY TO RESIDENTIAL AREAS
NATURAL AND AGRICULTURAL LANDS
CONNECTION TO MAIN ROAD NETWORK
TOPOGRAPHY - DIGITAL ELEVATION MODEL

FEASIBILITY
COST OF OPERATION AND MAINTENANCE RETURN ON INVESTMENT / NET PRESENT VALUE OPERATING PERIOD

ADDITIONAL FACTORS

CONSTRUCTION MODEL
THE EASE OF INSTALLATION - A MODULE TO CATER FOR DIFFERENT PROGRAMATIC REQUIREMENTS

USERS / STAKEHOLDERS
PROJECT IMPLEMENTATION DIFFERENT STAKEHOLDERS AND OUTPUTS USER PARTICIPATION AT DIFFERENT LEVELS

LIFE SPAN
PROJECT TIMELINE AND POST OPERATING PERIOD

TACKLING SYRIA’S RUBBLE
THE PROJECT SITUATES ITSELF WITHIN POST-WAR SYRIA, A COUNTRY THAT HAS BEEN GOING THROUGH ENVIRONMENTAL, SOCIAL, AND POLITICAL TURMOIL SINCE 2011

ALEPPO
35,926 Bldgs Demolished

THE AMOUNT OF DEMOLITION IN SYRIA IS ESTIMATED TO BE 50 MILLION TONS. ALEPPO, THE MOST DESTROYED GOVERNORATE HOLDS MORE THAN 56% OF THE WAR DAMAGE. THE ANCIENT CITY OF ALEPPO HAS BEEN ON THE LIST OF WORLD HERITAGE IN DANGER SINCE 2013 FOR ITS MANY VULNERABLE CULTURAL AND HISTORICAL LANDMARKS.

ALEPPO_DAMAGE POINTS
Area of Aleppo 10km
Emergency Concrete Waste Quantity: 31.8 million tons

SITE RESEARCH AND ASSESSMENT
The site assessment process is developed in GIS [Geographic Information System] and follows a specific multi-criteria evaluation. Different environmental and transportation factors are studied to optimize the selected site.

VOLUME OF DAMAGE IN JANUARY 2017 TAKEN AT 50% IS ENOUGH TO COVER DOUBLE THE SURFACE AREA OF ALEPPO
ALEPPO MODULE #5
CASE OF KARM EL MAYSSAR_ URBAN CAVITY_PILOT MODULE

Located in Karm El Mayssar, one of Aleppo’s severely damaged neighborhoods, a plot of land of longitudinal proportions cuts through a stretch of the urban grid enhancing its connectivity to its surroundings. This void in the neighborhood presents an opportunity to host the temporary recycling module with the potential for a future public space.

II MODULES TO BE IMPLEMENTED WITHIN ALEPPO
OPERATIONAL CAPACITY: 3,787,505 Tons/Year

The number of years needed to process all the emergency waste is 10 years, after which the module will only be receiving steady state construction demolition waste.

ADAPTABILITY ALONG THE FABRIC
7 SELECTED SITES IN ZONES WITH 100% DAMAGE

The proposal holds a modular system that allows it to react flexibly to different locations through site responsive configurations. On a practical level, it consumes nearby waste, processes it, and transforms it to usable material. On a civic level, it ensures newfound prosperity in local job opportunities and cultural continuity; a renewed sense of hope and livelihood.
The Module takes a linear configuration in karam of mynawar reflecting the existing urban fabric and makes use of the surrounding road network for rubble transport and civic circulation. It sits on a longitudinal site that has always been a void within the neighborhood.

After the recycling life span of the Module is achieved, the selected ground has the potential to become a public space activated by urban benches, once the footings of the module, with the intention of creating a civic program to the inhabitants of the neighborhood.
MODULAR SCAFFOLDING SYSTEM
Flexible and temporary, the system caters for all types of programs. Whether open or closed, the structure takes on different forms in reference to both program and function.
RESEARCH SPACE
Specialized in giving specific training to the workers who are willing to participate in the aggregate recycling project, from machine handling to the raw material itself.

LECTURE SPACE
A platform for the researches to share their findings and analysis, while brings in the public to learn more about their city.

STAIRCASE
The stairs takes the users to the open roof terrace space, which overlooks the campus of the facility.

CAFETERIA
Acts as a meeting spot for the different participants of the Module and the community around. It would serve the users with food, services and a resting space.

TRAINING SPACE
Dedicated for the community to participate and collaborate on different works that would contribute to the study of Aleppo's education, culture and history.

OFFICES & INFIRMIARY
Upper floor offices take care of the managerial aspect of the module. It organizes the rubble transport, workers salaries and the program of communal facilities of the module. The infirmary serves as an equipped space in case of a health emergency on site.

PUBLIC BENCHES & STAIRS
All footings act as public benches in the facility. They may also hold an entire module or only a staircase to upper level terraces.

RESTROOM & LOCKERS
The structure contains lockers, toilets with an open terrace on the floor above for the workers to use and enjoy.
LINEAR CONCRETE RECYCLING PROCESS

- **SORTING TUBES**
  Sorting aggregates into:
  1. Fine Aggregate Pile
  2. Course Aggregate Pile
  3. Larger Aggregate Pile

- **CRUSHER 02**
  Turns bulks into.aggregate ready for sorting

- **FE SEPERATOR**
  Residual Stock-Pile Metals

- **CRUSHER 01**
  Detaches concrete bulks from other attached material like metals etc.

- **PRE SORTING MANUAL SEPERATION**
  Residual Stock-Pile Mixed Material Cultural Archeological Sorting

- **LOADING ZONE**
  Truck Loads onto the loading zone to begin recycling process

- **STOCK PILES**
  Sorted by Geographic Zones from where they are acquired

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**DESIGN PARAMETERS**

For Recycling Facility in Aleppo

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Case of Aleppo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steady State Concrete Waste Quantity</td>
<td>t/year</td>
<td>603,543</td>
</tr>
<tr>
<td>Emergency Concrete Waste Quantity</td>
<td>T/year</td>
<td>16,486,857</td>
</tr>
<tr>
<td>Y years to process all emergency waste</td>
<td>years</td>
<td>10</td>
</tr>
<tr>
<td>Required Operating Capacity</td>
<td>T/year</td>
<td>2,252,229</td>
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<tr>
<td>Operating Capacity / module</td>
<td>t/year</td>
<td>364,000</td>
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<tr>
<td>Required Number of Modules</td>
<td>#</td>
<td>11</td>
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<tr>
<td>Operation period / Module</td>
<td>years</td>
<td>25</td>
</tr>
<tr>
<td>Area / Module</td>
<td>m²</td>
<td>10,000</td>
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<tr>
<td>Price of Recycled Aggregate</td>
<td>$/T</td>
<td>(3 - 5.3)</td>
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<tr>
<td>Years to Break Even</td>
<td>years</td>
<td>(3 - 12)</td>
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The competitive price for recycled concrete aggregate alleviates the pressure from quarrying natural aggregate and renders the recycled material an attractive commodity.
NEXT STEP: RESEARCH IN PRACTICE GRANT

PROCESS
- DATA MINING
- MATERIAL RESEARCH
- MATERIAL ACQUISITION
- MARKETING CAMPAIGN
- PRODUCT DEVELOPMENT
- ROLL-OUT

PROBLEM
- QUARRYING
- ILLEGAL DUMPING OF DEMOLITION WASTER

STRATEGY
- TARGET SCALE
- TARGET CUSTOMERS
- PARTNERS
  - MINISTRIES MUNICIPALITIES
  - DEVELOPERS CONTRACTORS
  - ARCHITECTS COMMERCIAL
  - GALLERIES INDIVIDUALS ARTISTS

SOLUTION
- SAVE THE ENVIRONMENT
- PRODUCE GOOD QUALITY PRODUCTS

PRODUCT
- TILING
- INTERIORS
- STRUCTURAL
- MASONRY
- EXTERIORS
- HARDSCAPE
- SIDEWALKS
- INFRASTRUCTURE