THE GLASGOW SCHOOL OF ART

RESEARCH EXCELLENCE FRAMEWORK 2014

Mackintosh School of Architecture

Primary Substation, 2012 Olympics, London

Submitted by Northern Office for Research & Design

Output No. 2

Primary Substation, 2012 Olympics London

DESIGN RESEARCH

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General Description 1.0

The Primary Substation for the 2012 Olympics is a vital piece of infrastructure, helping to supply the new Olympic Park with electricity. The building will continue to provide this function beyond the life of the Olympic Games.

Given it's critical role it was the first completed building at the park. It is situated close to rail lines in the Kings Yard area of the site. The building itself houses three large transformers within a secure compound, not accessible to the general public but has a significant visual presence on the site given its size; it is 70 metres long with a tower at each end, one rising 9 metres and the other to 16 metres. Its monolithic presence brings together 130,000 ebony coloured engineering bricks, variously arranged to provide protection and ventilation to the plant housed inside.

As an unoccupied building and as a large substation the requirements placed upon the design do not mirror those of most built projects, perhaps exemplified by the lack of any requirement for windows but the necessity to provide blast protection.

The development of the Olympic Park is a large and relatively new undertaking. It is also predominantly a 'blank canvas' for which a large swathe of land in East London has been procured for this sole purpose. As such it represents a relatively unique situation in a contemporary Western metropolis whereby so little existing built context exists and so much and so varied an urban fabric will be created in a very short space of time. Additionally, as an Olympic Park the site will assume two very different guises over the course of barely a decade; firstly for the event itself and then in the so-called Legacy mode.

Research Questions 2.0

1. How can a building accommodate a contextual approach to its design when so much of the surrounding context is yet to be built and when its context will change so markedly over a short space of time?

2. How can such a building design best respond to the specific and varied technical requirements imposed upon it?

3. Can brick as a material be made to respond to the needs raised in the above questions?

Aims & Objectives 3.0

1. To design a building which responds to the varying historical, current, short-term and long-term contexts of the site.

As the first building on the site the substation will influence others. As such it is given a coherent, legible and assertive, though relatively understated, presence from which others can take their cue. The utility structures have been developed to consider a common palette of reference materials where these relate to their use and location. The choice of this palette of materials then becomes pivotal in grounding the building in its historical context as well as over the longer term.

NORD's approach to materials extends a desire to be sympathetic to the traditions of utility buildings and the industrial context of Waterdene Road. The existing Edwardian industrial buildings with their dominant use of brick characterise much of the City's material heritage and NORD were keen to reference this with the use of brick as the primary material for the electricity substation. The choice of brick gives a formal and urban character to the building similar to the existing buildings adjoining the site. When thinking of a landscape character for this site it is important to consider the history of the area and the references to both the industrial heritage of the area and that of greater London. Buildings of this nature are part of the everyday experience of our cities and we felt this was a key consideration when progressing with design ideas. The materials make strong reference to the local post-industrial environment.

Around the coolers NORD make reference to the use of Victorian airbricks and vented chimneys where the detailing of the brick changes as it responds to a functional requirement to allow air through and around the coolers. This 'perforated' brick envelope around the coolers at the West and East of the site then becomes an opportunity for lighting where the simple use of backlighting changes the appearance of the building dramatically at night; a further, perpetual condition of the context that must also be addressed.

The aim has been to create an enduring building and brick gives visual weight and density that brings a sense of permanency. The use of a single material also offers an inherent sculptural quality which can be harnessed. This is pertinent given that restricted access to

the building means connections to it are primarily visual and from distance. NORD therefore approached the building mass as a sculptural form, where the singular use of one material has been explored in relation to the functional form of the building and its context.

NORD have developed a strong contextual approach to the building as a whole where the use of brick has been chosen as a consistent building material to emphasise the character of the site. The challenge for NORD was the creation of a sculptural form, which celebrates the use of brick, responds to the functionality of the building and it's technology and creates visual reference both during the day and at night. The brickwork is continuous, sculptural and monolithic in its presence, whilst subtlety in the building mass is addressed through the wrapping of the material on ground surface, walls and roof. Changes in the detailing of the brickwork where it is stretched across the façade forming an open pattern to allow for ventilation through and across the cooling towers breaks down the mass and offers the potential for illumination at night as mentioned. This consistency in the use of one material and the effect of wrapping the material over the roof is a conscious decision to attempt to create the sculpted brick landscape. The lower section of the building grows out of the brick ground plane and wraps over at 4.8m creating a sculptural plinth on which the cooling towers sit. At night these towers appear to float above the plinth like large brick 'baskets' and the 4.8m datum line, which ties in with the adjacent land bridge, becomes an additional and critical contextual reference.

NORD's approach to the appearance of the electricity substation has evolved from an understanding of the material qualities evidenced in London's rich industrial brick heritage and specifically in the British tradition of utilities building design. The appearance celebrates the honesty and functionality of the building where the sensitive but creative use of materials results in a landmark building rooted in its industrial heritage.

In conclusion the building has been designed to respond to the changing context in a number of ways. Its response to the historical context is bedded in the material choice and detailing. Britain's rich heritage of designed utility structures is referenced, though not imitated, again both in materials and in the overall rigour and simplicity of the sculpted form. The current and future context is managed through a clearly defined but relatively understated presence intended to provide potential references for future work, whilst the apparent mass and solidity allied to the sculpted ground plane are intended to hold the

space around it creating an assertive and grounded presence in the existing transient landscape. The sculpted form acknowledges both the adjacent datum of the land bridge and the viewing corridor across the site, pertinent to both present and future conditions.

2. To design a building which responds to the specific and varied technical requirements of this particular brief.

A further key consideration in the development of the design is that the electricity substation is a building containing complex plant and equipment with very specific technical requirements. This must be integrated with the already mentioned wider contextual needs to form a coherent whole. Such a whole can best be achieved through an efficiency of design moves whereby one device can meet a number of disparate challenges. The use of brick offered a number of opportunities for such efficiency.

As an established material brick requires little maintenance and its durability has been proven over the longer term. The selection of engineering brick further enhances this durability whilst also allowing a subtlety of detailing not possible with less robust alternatives. Further, it is a material of which contractors have an intimate knowledge, thereby offering additional flexibility in detailing and assurance in terms of budget and timescale.

Security requirements on buildings of this type are understandably paramount given the importance of consistency of supply. The brown roof created through the recycling of bricks taken from the site responds to three separate challenges; its weight adds structural integrity as part of the blast protection and security strategy, whilst it also responds to environmental objectives of biodiversity as well as the contextual aspirations mentioned above.

The brick is also made to perform in a number of ways, as landscape, structure, weather-tight skin and ventilating panel, answering the variety of needs required by the equipment housed inside. The form is largely defined by this equipment, though through dialogue and design team collaboration it has been possible to create a carefully modulated form which responds both to the technological needs of the brief and the sculptural and contextual requirements of the wider context already touched on. Anticipated future developments of the internal equipment have also been considered, ensuring as far as possible that the

objectives of longevity and sustainability considered in relation to other challenges within the brief are maintained here also.

The achievement of this aim is evidenced in the review and esteem indicators below.

3. To advance to the accepted parameters in the use of brick as a material to the end of responding to objectives 1 and 2.

In answering the above questions it has been necessary to expand our understanding of brick as a material and its potential as a building material. As an established material there is a vast body of evidence from which to draw conclusions. Close collaboration with other members of the design team as well as external sources (manufacturers, literature, existing built works etc) was collated as part of a research phase and the existing parameters clearly defined. Merging our knowledge of these limitations with the aspirations created through the evolution of the brief then allowed us to draw conclusions on how these challenges could be met. Again the achievement of this objective is better evidenced in the peer review and esteem referenced below than might be written here.

Context 4.0

The practice takes great inspiration from the UK's legacy of 'making things'. Within industrial Britain there was often a sense of collective pride and craftsmanship about what came out of factories and workshops. This interest and passion for materials, technological innovation, for detail, craftsmanship, texture and pattern is something, which underpins the work of NORD. NORD are often provoked and inspired by social and cultural issues inherent in the contemporary city and believe that this awareness also allows a response in form and materiality. Such an approach has led to the development of a series of buildings, places, products and objects, which respond to 21st century, needs but celebrate the British tradition of craftsmanship and love of materials. With a foundation in delivering award-winning architecture and commissioned research into the built environment, we are driven by an aspiration to create genuinely unique architectural solutions. NORD believe that if we are to rethink the present, we need to constantly recalibrate the relationship between tradition and innovation, knowledge and imagination.

As stated the context of the site itself is one of a varied mix of past, present and future use and as an Olympic Park it is also a politically charged and highly newsworthy one. Issues of project timescales and budget must bare exceptional scrutiny on a job of this nature and this has to be taken into account from early design stages. The client group is also large and multi-faceted with a complex relationship of owners and stakeholders, restrictions and guidelines. It is further acknowledged that this building is a facilitator for other events on the site and not, as stated above, and event in its own right. We believe that all of these factors, as a part of the process of design should be, and are, exposed in the completed building.

Research Methods 5.0

NORD's response relies to an extent on semiotics and as such could easily betray a specific and personal interpretation of embodied history and meaning in any given design decision - perhaps most obviously in the choice of materials. It is therefore critical that a thorough understanding of the context and the myriad facets that this word encompasses is brought about through the most comprehensive analysis. Site analysis is the most obvious first recourse, involving research into the social, political, economic and geographical context.

The proposal for the electricity substation went through a number of design development propositions as more detail relating to context, legacy, security and technical requirements became available. The outcome is the result of a lengthy process of investigation into the architectural design approach for a utility building on the site, the relationship to neighbouring infrastructure, the legacy context, use of materials in relation to both building form and mass and issues of biodiversity.

This process is facilitated via a variety of media from hand sketching and model making to 3D visualisation and measured drawings, all of which are then used for personal or in-house assessment and can then be disseminated amongst the design team for comment and further development. More specific to the brick itself was the creation of a number of mock-ups on site with the contractors who would be responsible for the build. As part of the experimental phase in the development of details this allowed a variety of issues to come to the fore as well as providing 1:1 models for assessment. The practicality of building innovative brick bonds is easily reviewed by these methods and of course highlights related issues of cost and timescale which are assessed in parallel with issues of aesthetics, structural integrity etc.

Dissemination - Publications 6.0

Stewart, Dan. 'Image: Power behind 2012 Olympics revealed', Building, 13th Feb 2008

Abrahams, Tim. 'The Aesthetics of Infrastructure", Blueprint, July 2009, pp28-52

Woodman, Ellis. 'Nord's Olympic substation is first to the finishing line', Bdonline, 9th Oct 2009

Waite, Richard. 'NORD completes first building for 2012 Olympic site', Architects journal online news, 9th Oct 2009

'2012 London Olympics Construction Progress', E-Architect, 26th Oct 2009

'London 2012 powers ahead as first Olympic Park building is complete. New substation switched on to supply electricity to Olympic Park and Stratford City development', London 2012 news, 26th Oct 2009

Spring, Martin. 'The Building Blocks of Quality', Architect's Journal Specification, Nov 2009, pp31-35

'Electrical substation, Olympic park, London', Dzine, Ibstock, Autumn 2010, pp12-13 autumn 2010

'Station to station: the new power generation', The Indpendent, 5th Aug 2010

'First Person column', Brick Bulletin, 1st Jun 2010

translated to Danish by V. Krogh. 'Monumentalitet & Kontrast', TEGL, 1, 2010, pp12-17, 1st Mar 2010

Star auf Zeit, Powerpunkt: Material Wirkt, Deutsche Bauzeitung, February 2010

London Olympic Park, Casa Brutus, Takefumi Ishiwatari, Issue No. 149, pp139, March 2012

Experimente Gewurdigt, Wienerberger Brick Award 2012, Bauwelt 21.12, Bauerverlag BV GmbH, pp16, May 2012

Skin Care, Azure, AZURE Publishing Inc, pp39, June 2012

Pragmatik und Poesi, Bau Meister 08 2012, Callwey GmbH & Co Kg, pp60-63, August 2012

London Power Play, AIArchitect, American Institute of Architects, August 2012, http://www.aia.org/practicing/AIAB095533

Eastside Story, Volume 2: Olympic Park, AJ Publication, pp96,97, September 2012

Brick'12 - Award Winning International Brick Architecture, Callwey GmbH & CO. KG, pp 10, 22-25, 2012

Lucy Bullivant, New Arcadians - Emerging UK Architects, Merrell Publishers Limited, 2012, pp156-169

Architecture & Urbanism - No. 506 March 2013

Alberto Ferlenga, Marco Biraghi, Benno Albrecht, L'Architetturadel Mondo. Infrastrutture, Mobilita, Nuovi Paesaggi. Editrice Compositori, pp139, 2013

Dissemination - Exhibitions

Royal Scottish Academy, Edinburgh, Architecture Open 2012,

RIBA San Francisco Chapter, San Francisco, May 2012

Eidgenössische Technische Hochschule (ETH) Zurich, 2012

We Made 2012, The Building Centre, London, July 2013

Esteem Indicators 7.0

RIBA award 2010 and subsequent Stirling Prize Longlisting (on list of 19)

Brick Development Association, Brick Design Awards 2010

Award for Best Public Building
Supreme Winner Award

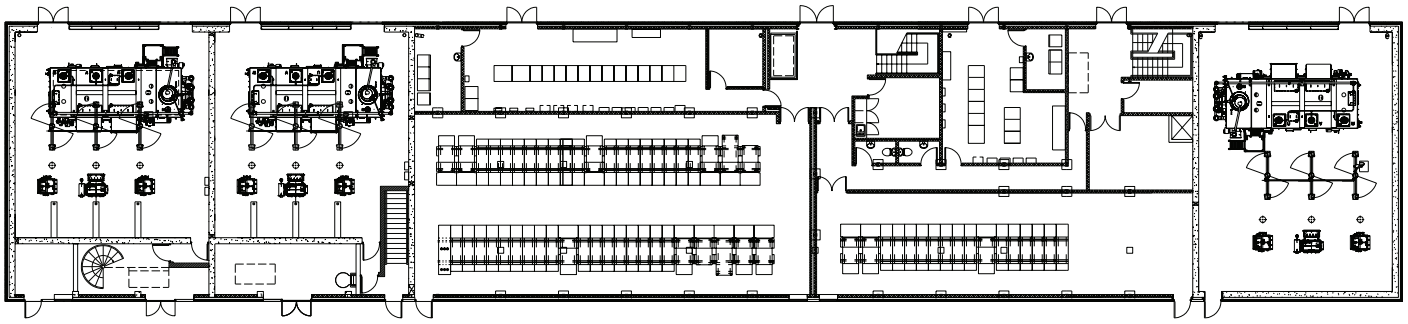
Scottish Design Awards - Winner in Regeneration Category

Wienerberger International Brick Awards 2012, Best Non Residential Building (Winner)

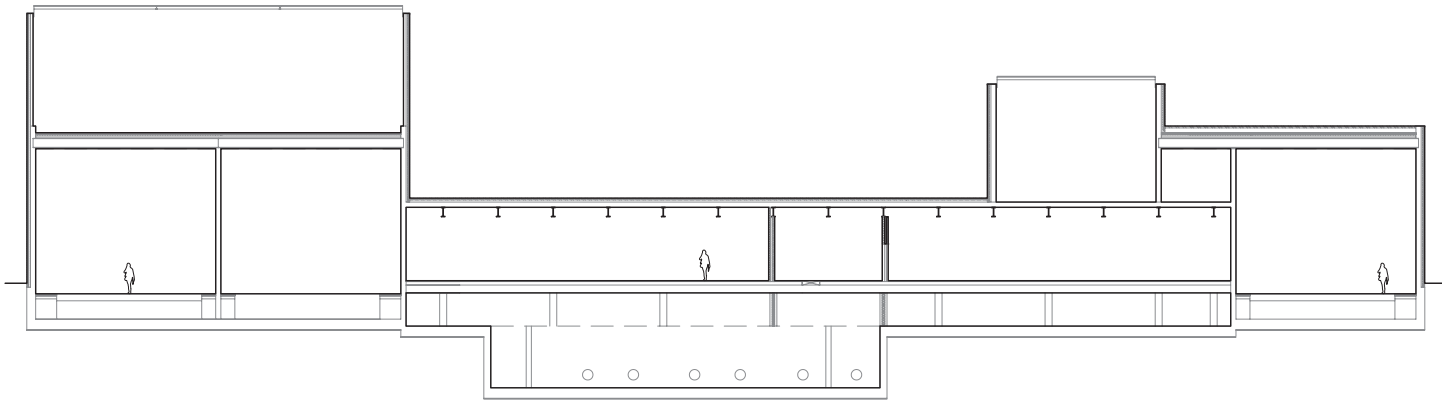
Battersea Power Station - British Utility Structures

Olympic Park Masterplan

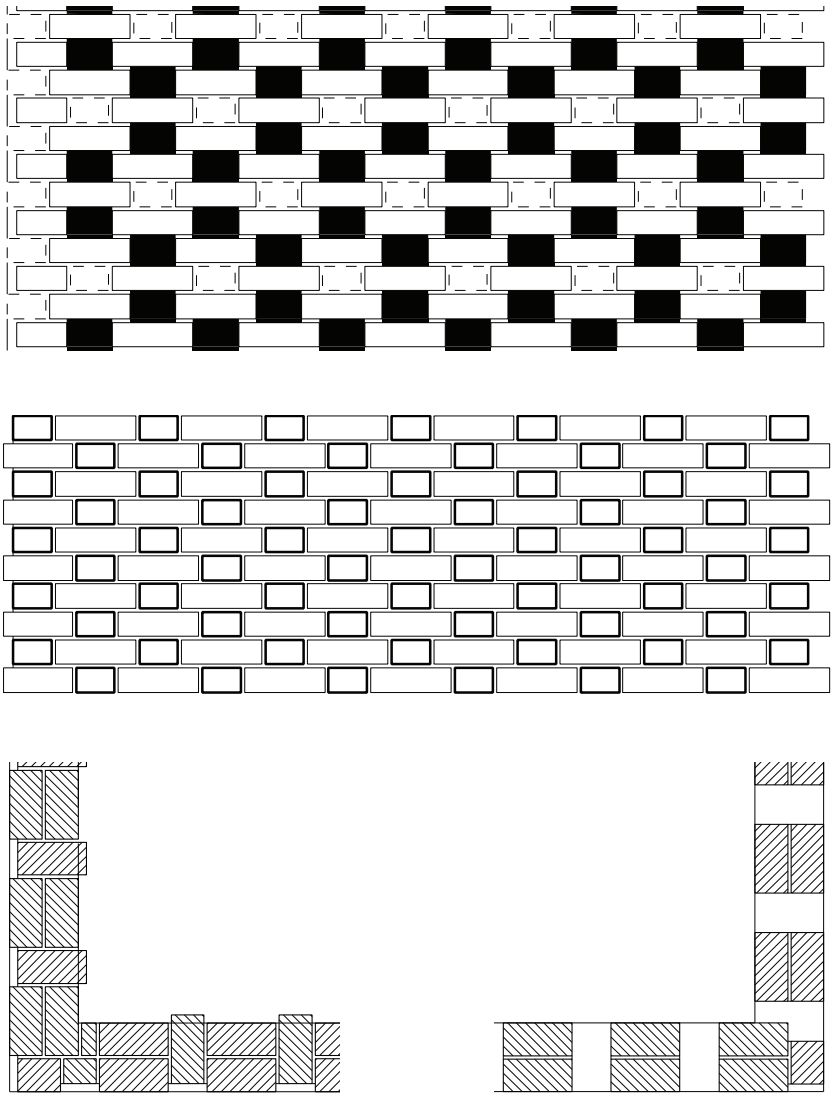
South Elevation



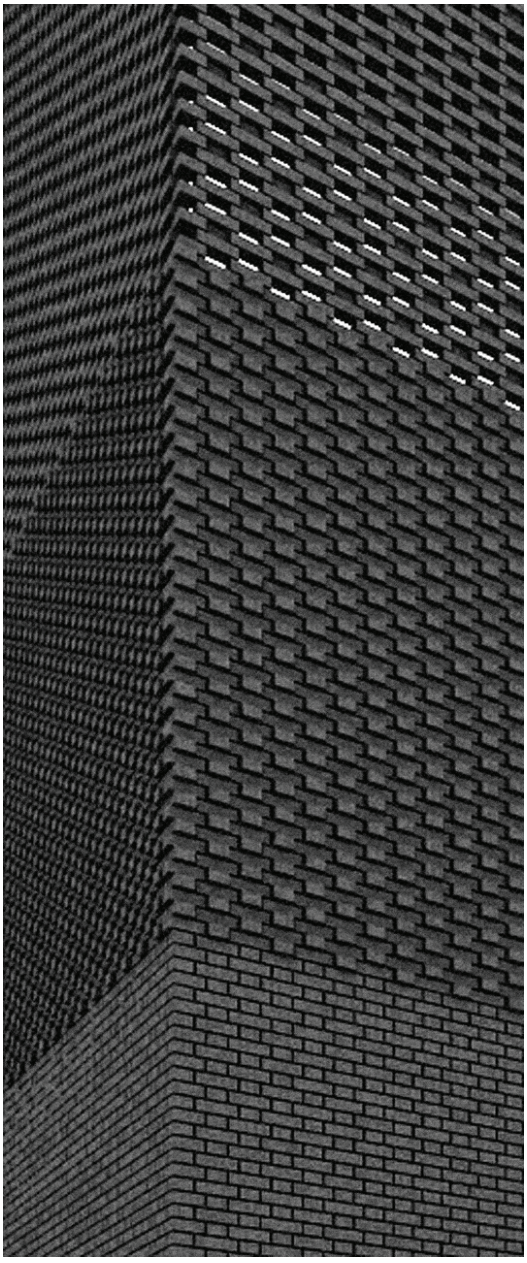
Ground Floor Plan

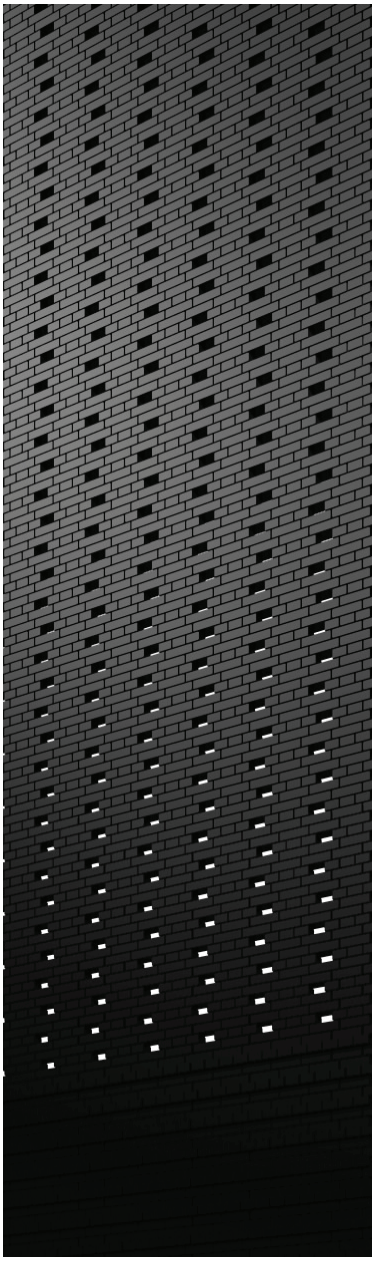


Long Section

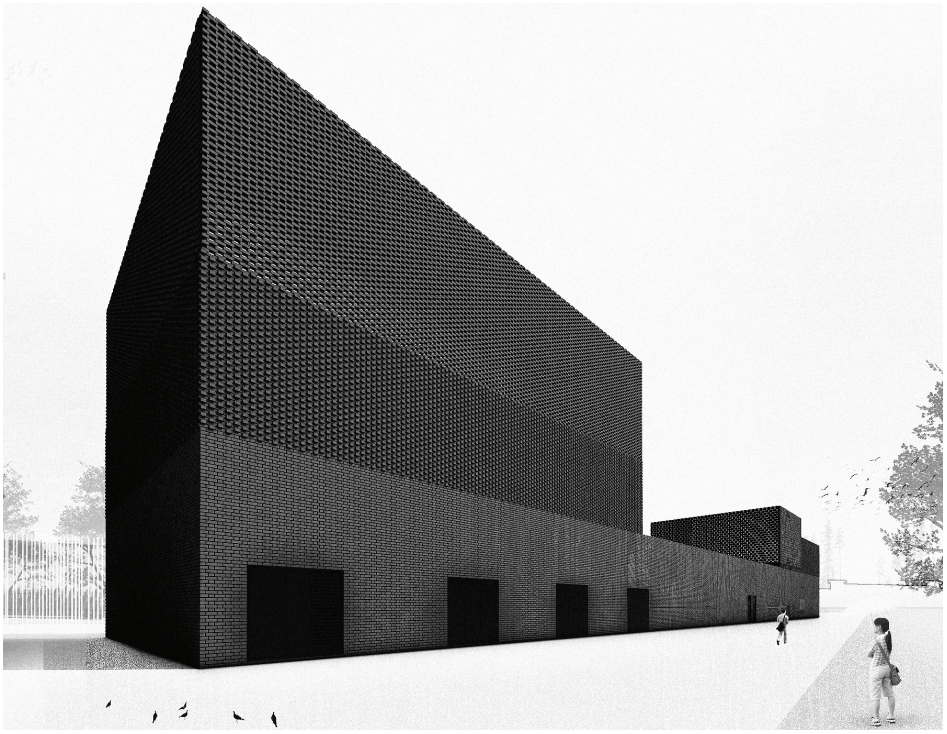


Brick Detailing



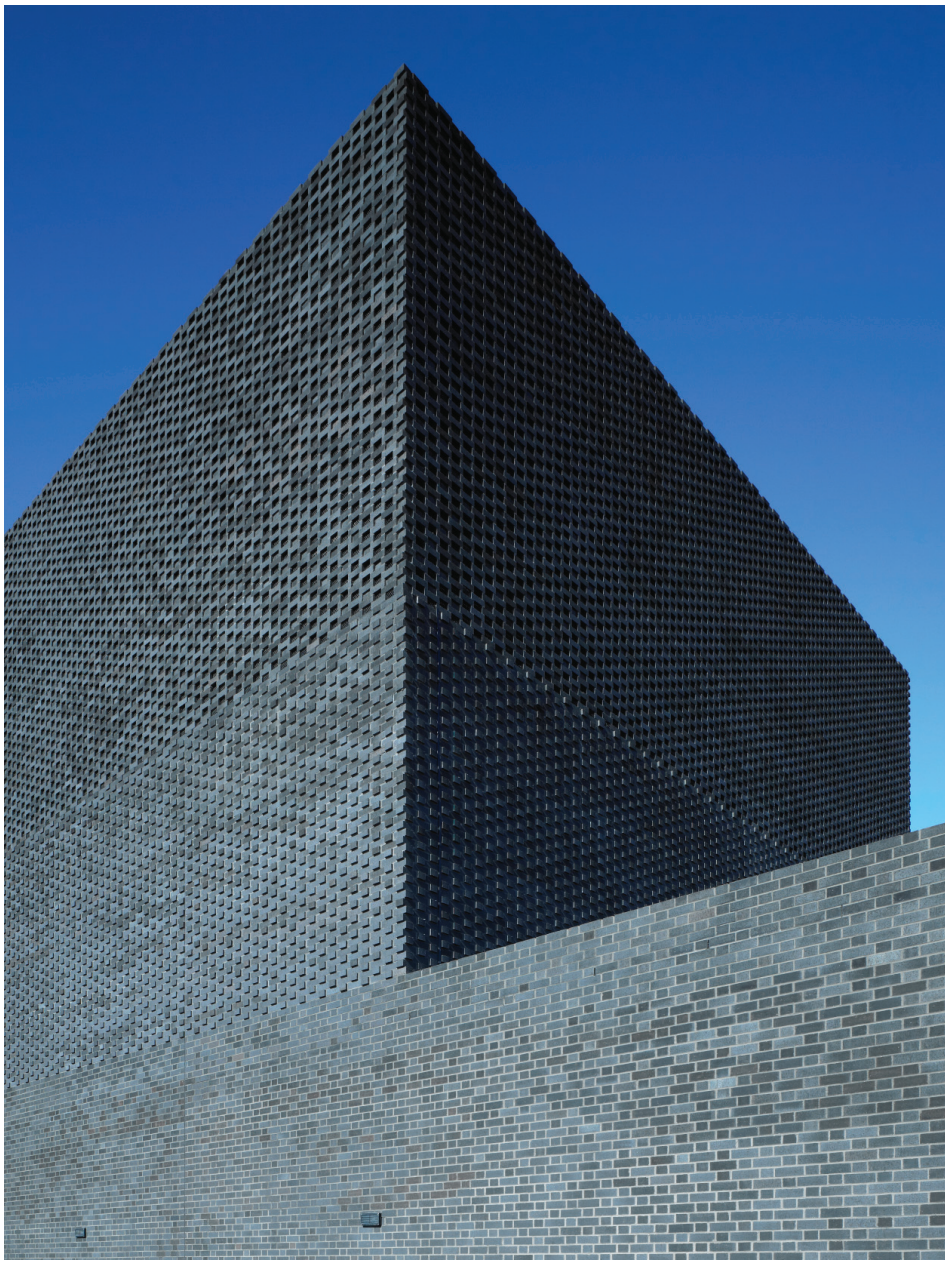


3D Modeling Studies



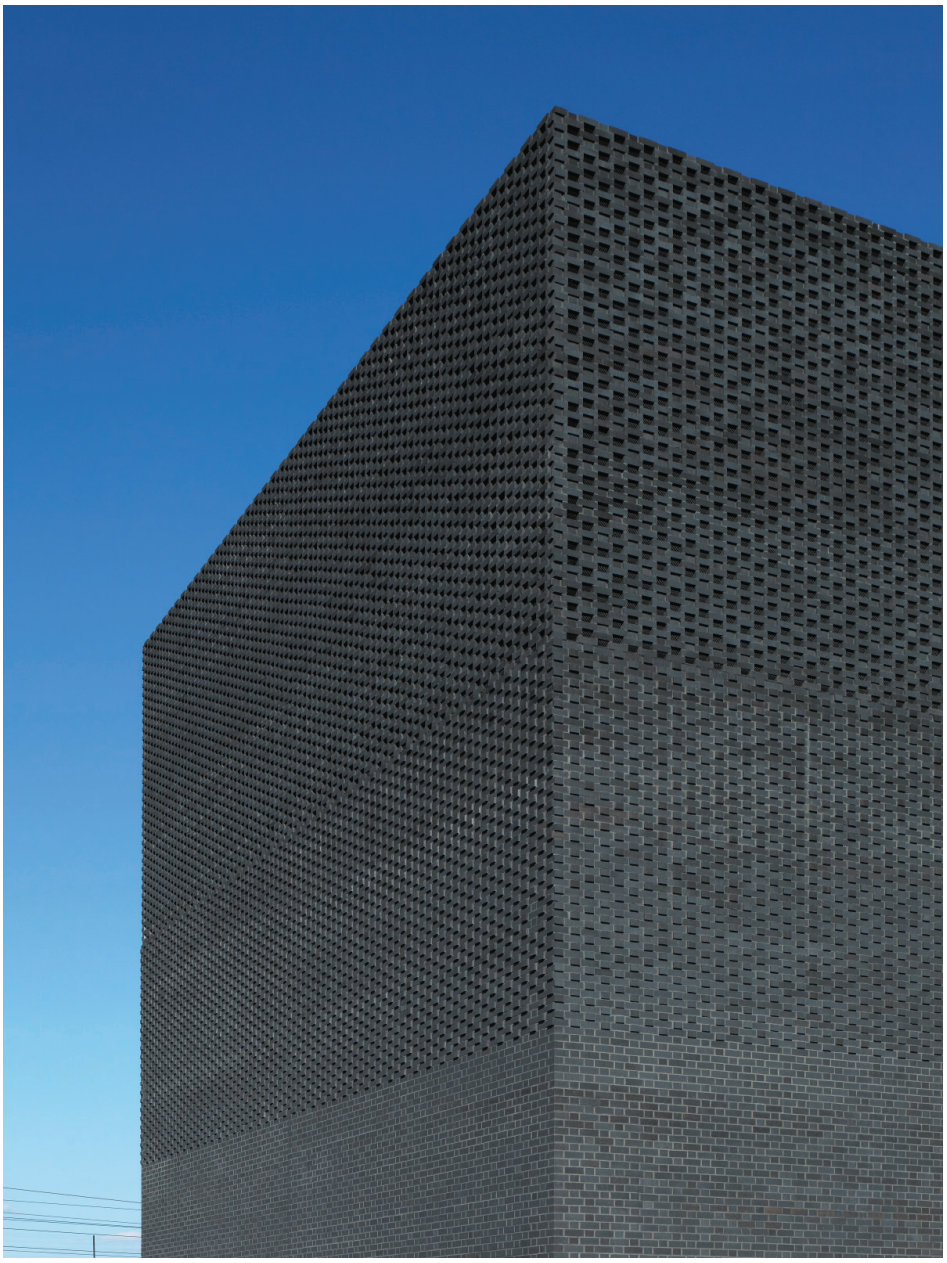
3D Modeling Study

Brickwork Sample Panels



Completed Substation

Completed Substation



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