Specifying Visual Concrete

Elaine Toogood

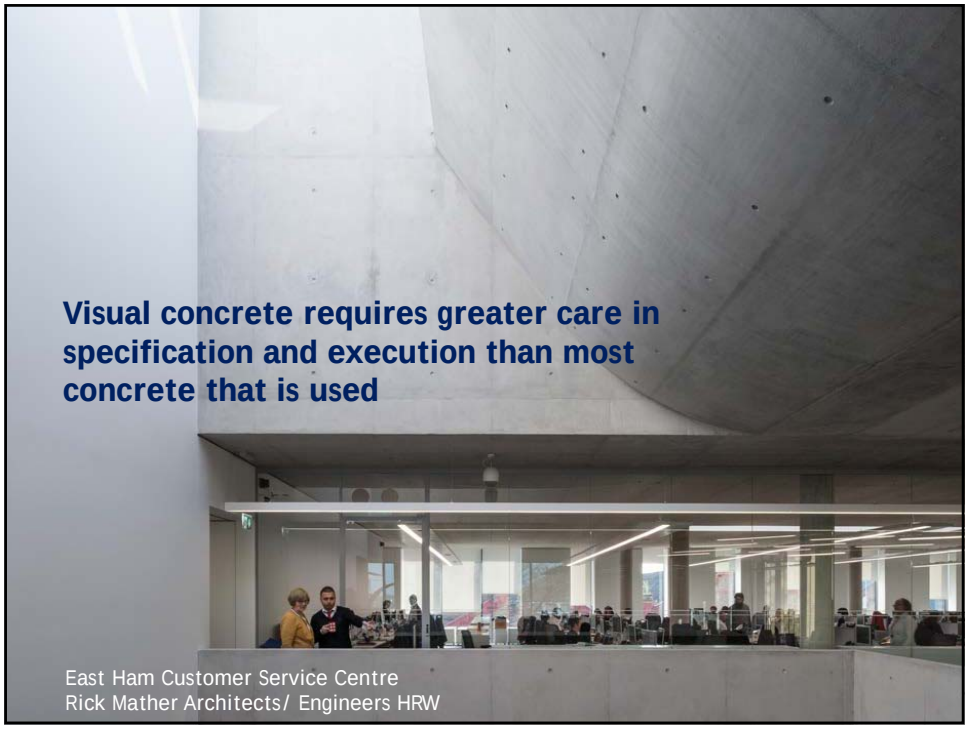
BA(HONS) Grad Dip Arch RIBA

Senior Architect, The Concrete Centre

The Concrete Centre: Taking concrete forward

- Free resource for specifiers
- Concrete Quarterly
- Publications: general and technical
- Practice workshops
- Seminars and conferences
- Training courses
- Webinars
- Concrete Elegance Lectures

www.concretecentre.com www.thisisconcrete.co.uk
www.sustainableconcrete.org.uk



Do some research/ get advice pre-tender

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BS EN 13670

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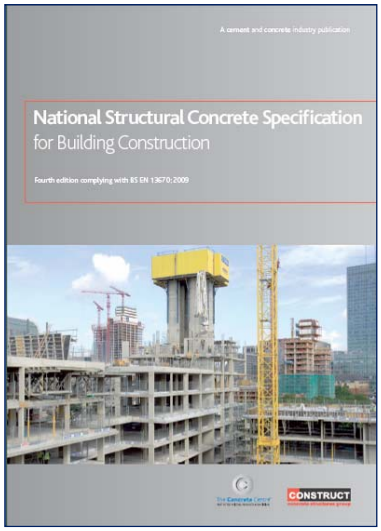
Table F.4 — Types of surface finish

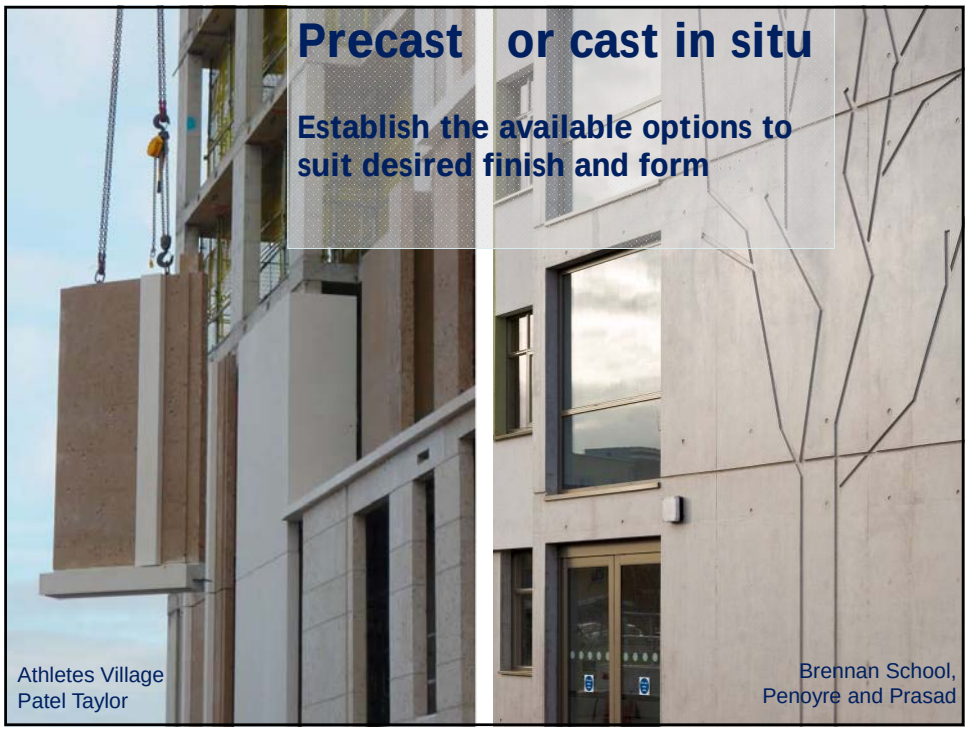
Type	Normal application	Examples
Formed surfaces		
Basic Finish:	Where no particular requirement is needed.	Foundations
Ordinary Finish:	Where not of visual importance or to receive applied finishes.	Areas with applied render finish or unseen surfaces such as inside ducts or lift shafts.
Plain Finish:	Where visual effect is of some importance.	Areas seen occasionally and areas which are prepared, direct painted areas where there are some particular requirements.
Special Finish:	Where special requirements have to be given	Areas where surface regularity and / or colour are important
Unformed surfaces		
Basic Finish:	A closed uniform surface produced by levelling. No further work is required.	Area to receive a screeded finish or other applied finishes.
Ordinary Finish:	A level uniform surface produced by floating or similar process.	Area for false floor and other applied floorings.
Plain Finish:	A dense smooth surface produced by trowelling or similar	Normal warehouses and factories, areas of plant rooms and work areas without other finish than paint.
Special Finish:	A surface where special requirements have to be given for further working of another finish.	Areas of warehouse floors for special trafficking.

The National Structural Concrete Specification for Building Construction – NSCS v 4



- Definitive, simple and straightforward
- Prepared by the industry – clients, designers, contractors and specialists
- Aims to benefit all, with information collected together in one place
- Download free pdf:

http://www.construct.org.uk/index.php/useful-stuff/publications



As struck cast in situ finish

Depends on facing to form work or form lining

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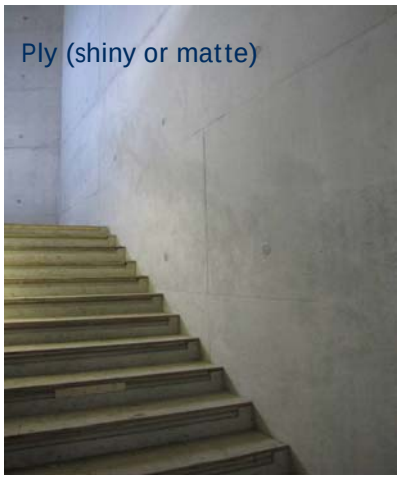


Evelyn Grace Academy
Zaha Hadid

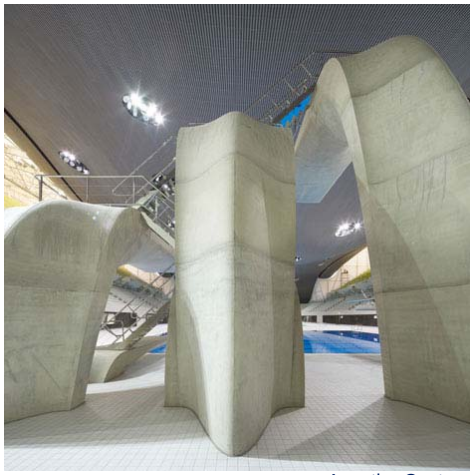
Lincoln Museum
Panter Hudspith

Understand more about the making processes

- Precast in factory conditions or cast in situ on site
- Range of products/supply/process of manufacture/delivery & construction

Visit examples & benchmark

Pudding Mill Lane Pumping Station
John Lyall Architects



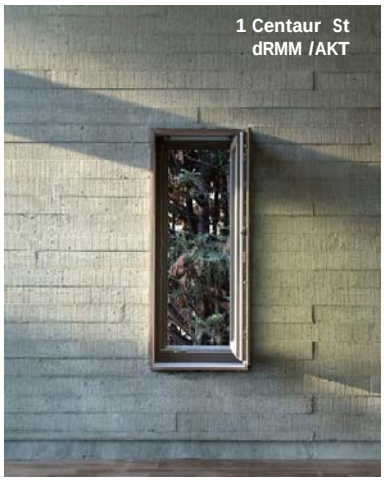
Aquatics Centre,
Zaha Hadid Architects / ARUP

Manage expectations

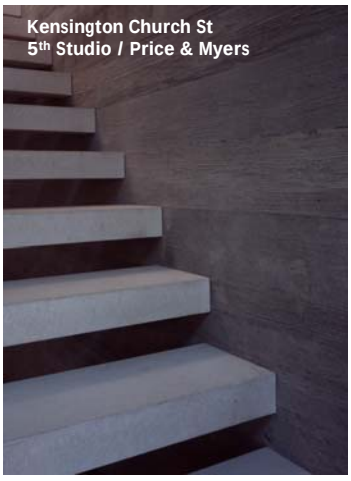
Westminster Underground station
Hopkins Architects

Angel Building, London
AHMM /AKT

Choose a finish – as struck in situ

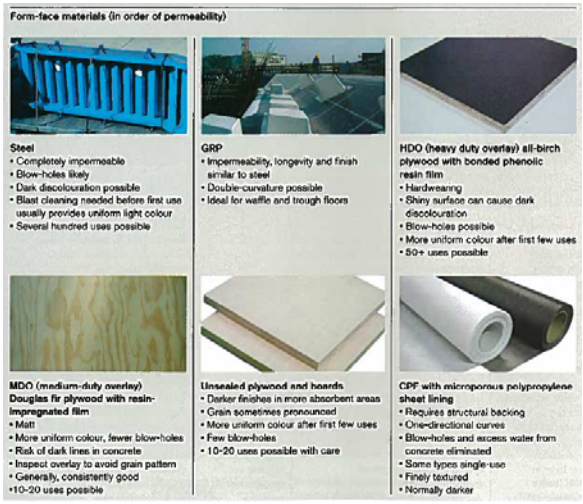


Saw cut timber facing



Scaffolding boards pressure washed and wire brushed to expose grain

Understand form face qualities



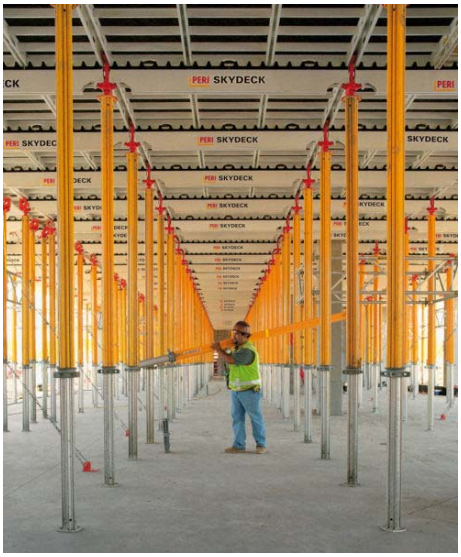
- Range of repeated use
- Cost
- Quality
- Finish produced
- Potential shapes
- Relationship with release agent

Impact of different ply facing

- Phenolic Film Faced Panels = Smooth Shiny finish to the concrete

- Medium density overlay (MDO) / Paper Faced Panels = Matt non-shiny surface finish to the concrete
- High Density Overlay (HDO) = shinier surface

Formwork systems



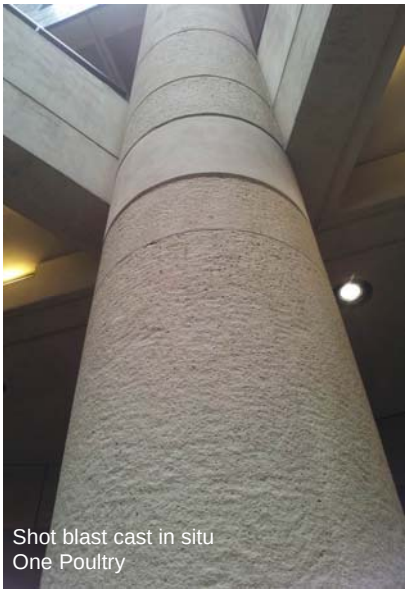
Fast and efficient formwork and falsework systems

Choose a finish- as struck precast

Hill Top House
Adrian James Architects/ Cornish Concrete Products

John Henry Brookes Building, Oxford
Design Engine/ Laing O'Rourke

Choose a finishing technique



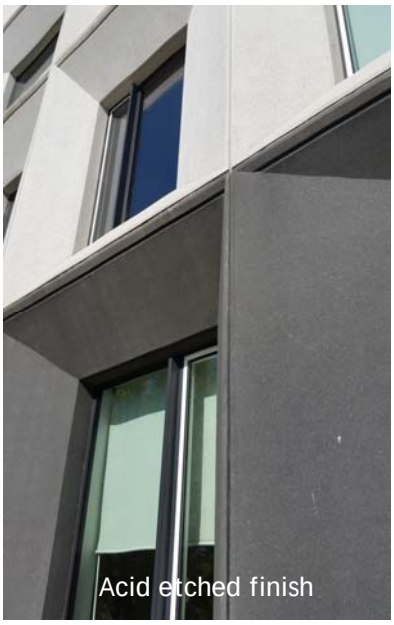
Shot blast cast in situ
One Poultry

Submariner's House, London
Jonathan Tuckey Design
Contractor:John Perkins Projects
Photo credit: Dirk Lindner

Pigmented cast in situ
Pan-floated unformed surfaces

Burntwood School- AHMM/ Burohappold

Same mix, different finishing processes to give variety of textures

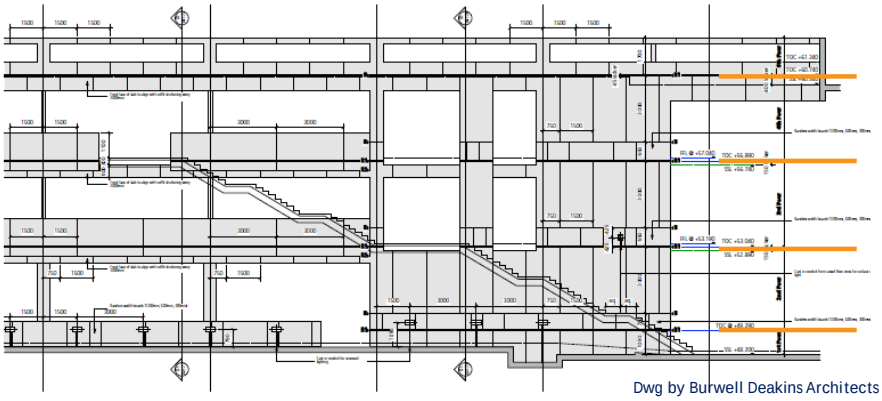


Burntwood School- AHMM/ Burohappold


Consider colour and texture
Nottingham Arts Centre
Caruso St John
Trent concrete


‘Photographic concrete’
Crevin School
Nantes, France
Graphic Concrete and Chryso

Simplify tender information



Dwg by Burwell Deakins Architects

- Clear indication of extent and design intent
- Set out formwork/ precast joints

Set tie bolt positions (design intent)

E.g.

- Minimum number required
- Equal number per board
- Aligned with each other

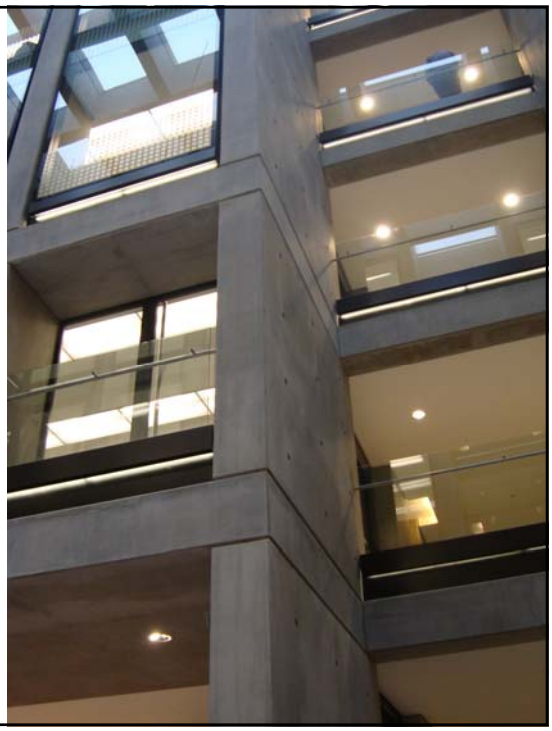
The Forum
ADP / AKS Ward

Define extent of embedded services or patterns

55 Gee Street
Munkenbeck and Partners

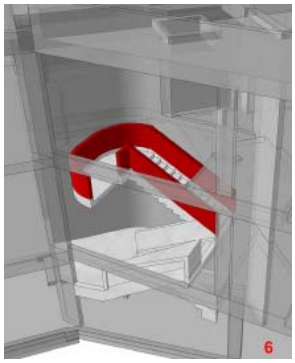
Consider location of day work joints

- Describe/agree where day joints are to be avoided
- Consider expressing joint for large areas



Angel building, London
AHMM/ AKT

Design and describe elements in 3D



East Ham Customer Service Centre
Rick Mather Architects/ Engineers HRW

Precast formwork for Experian Data Centre
Sheppard Robson

Understand and describe the forms to improve buildability and optimise formwork

Define concrete mix requirements for cast in situ concrete

Reinforcement

Admixture

Approx proportions of A typical concrete mix

- Good visual concrete requires a slightly different 'recipe'

Recognised 'Designed' mix proportions

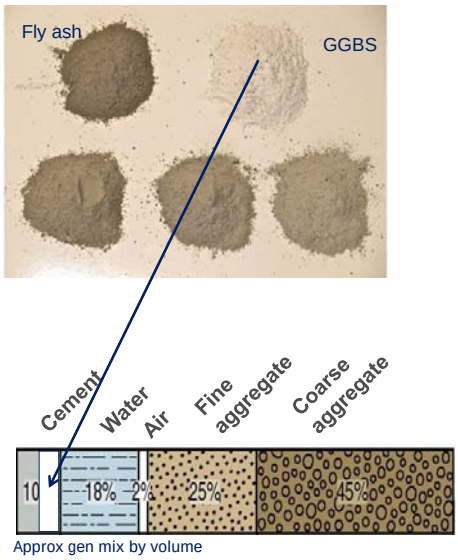
Recognised effective 'recipe':

- Cementitious binder (cement) – minimum 350Kg/m3
- Sand content – not more than twice the cement content.
- Total aggregate – not more than six times the cement content.
- Coarse Aggregate – For 20mm max. size not more than 20% to pass a 10mm sieve.
- Consistence – 125 to 150 slump S3
- Water/Cement ratio – 0.5 or less.

Or consider self-compacting concrete designed for visual concrete

SCC flow test instead of slump test

Define cement blend parameters



Approx gen mix by volume

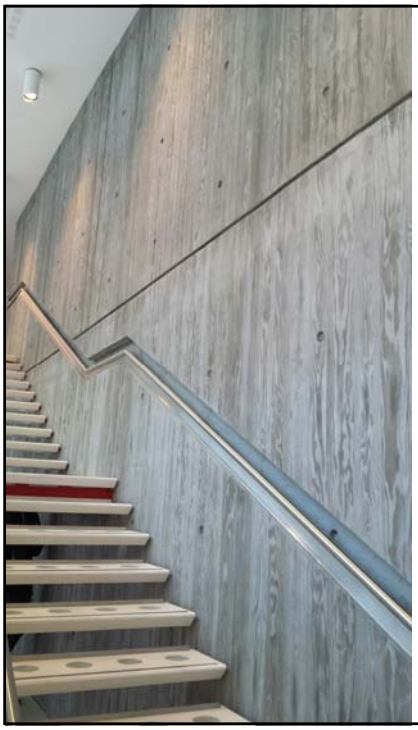
CEM	Addition	Portland cement replacement, %
I	~	0 - 5
IIA	Silica fume	6 - 10
	Fly ash	6 - 20
IIB-V	Fly ash	21 - 35
IVB-V		36 - 55
IIB-S	GGBS	21 - 35
IIIA		36 - 65
IIIB		66 - 80

BS 8500-1

GGBS blend

- Ground Granulated Blast Furnace Slag
- By product of iron/steel industry
- Reduces ECO_2
- Inherent pale, creamy colour
- 6-80% can be used depending on application
- Over 40% can impact early strength gain

Persistence Works, Sheffield
Fielden Clegg Bradley Studios



Fly ash

- **By product of coal fired power stations**
- **reduces ECO_2**
- **inherent smokey grey colour**
- **6-55% used depending on application**
- **High % can impact early strength gain**

Board marked cast in situ wall, Precast stair treads
IStrcutE offices, London
Hugh Brougton Architects/ Expedition engineering,

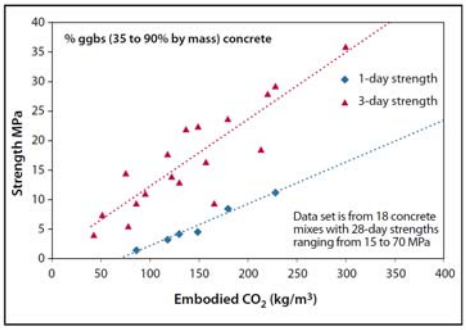
Approx 40% Fly ash,
self compacted concrete

Table 8: Strength gain of different concretes

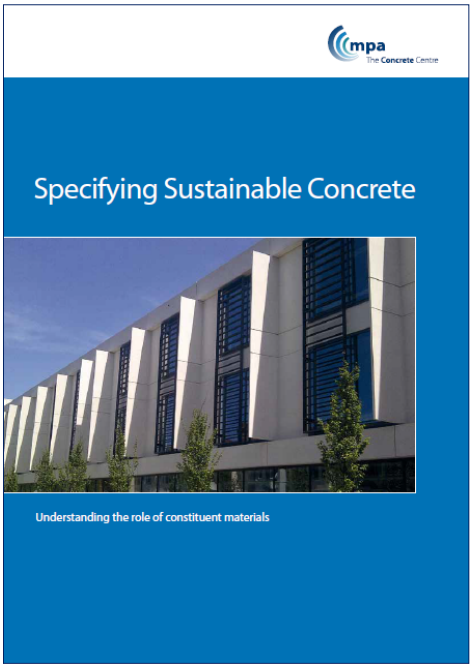
Concrete	Strength* at 7 days	Strength* gain from 28 to 90 days
CEM I concrete	80%	5-10%
30% fly ash concrete 50% ggbs concrete	50-60%	10-20%
50% fly ash concrete 70% ggbs concrete	40-50%	15-30%

* Strength as a percentage of 28-day strength
These figures are based on standard cure at 20°C.

Figure 2: Influence of embodied CO_2 on early strength



- Different cements have different colours
- Note: High % cement replacement impacts on early strength gain



Guidance for concrete specification including:

- Reduction of ECO_2
- Use of recycled content
- Material efficiency
- Responsible sourcing

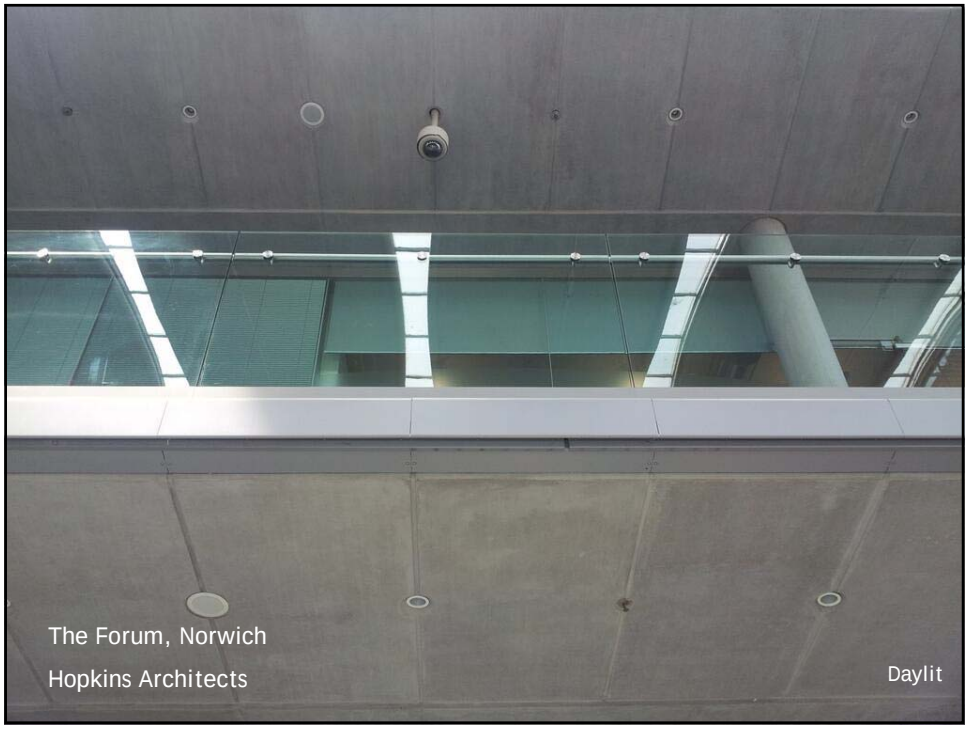
www.concretecentre.com/publications

Concrete colour

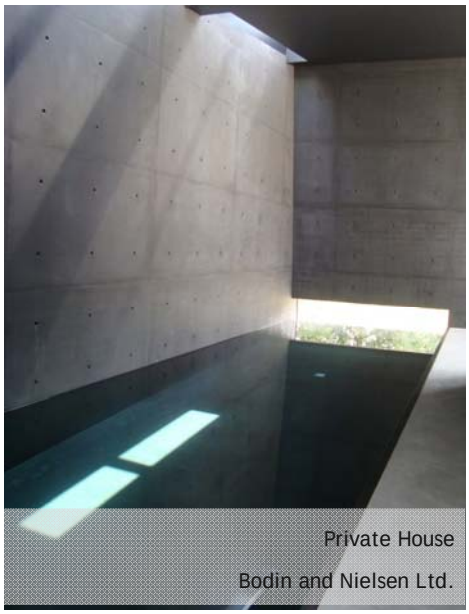
- Consider impact of lighting
- Don't be too specific at tender

The Forum, Norwich

Hopkins Architects

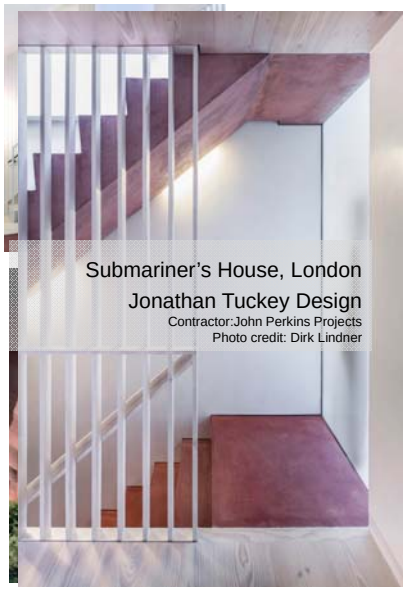


Pigmented concrete



Private House

Bodin and Nielsen Ltd.



Submariner's House, London

Jonathan Tuckey Design

Contractor:John Perkins Projects

Photo credit: Dirk Lindner

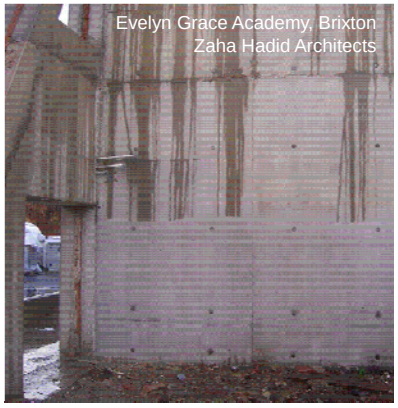
Get samples/ build mock ups

- To test mix/formwork/release agent/ curing time/workmanship combination
- To agree final finish & making good

Get samples/ build mock ups

Precast suppliers offer a large selection

Consider weathering or finishing coats



e.g. silane or siloxane coating or silicate based pigmented coating

Good workmanship

- Suitable facing, formwork and accessories, well constructed
- Appropriate release agent, applied correctly
- Cleanliness and communication on site
- Correct and consistent mix and materials
- Appropriate placement and compaction
- Adequate protection



Making good


- Some likely to be required for cast in situ
- If in doubt if needed – don't!
- Specification to state that method is to be agreed **before** carried out

It is a team effort

- Client understanding/expectation of finish
- Architects description of aesthetic requirements
- Structural Engineers specification
- Concrete contractor/ supplier input for project specifics