

Highgate School

OUTLINE CONSTRUCTION MANAGEMENT PLAN FOR SCIENCE BUILDING PROJECT

Rev C April 2020



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1.0 Executive Summary

Blue Sky Building was appointed to carry out a review of the construction programme and logistics for the Extension and Refurbishment of the Science Block, on behalf of Highgate School.

This report considers the programme and logistics impact of the project. These proposals can be considered as an Outline Construction Management Plan for inclusion in the Planning Application Submission and subsequently to form the basis of detailed Plans by the Contractor when appointed.

The Science Block project involves the refurbishment of the existing laboratories and associated spaces, including the Link Building to the West side of the Science Quad, together with two extensions. An extension of the first and second floors into the Garner Quad to the North side of the block will allow better special use for laboratories. An extension of basement, ground, 1st and 2nd floors into the Science Quad to the south side improves entrance and circulation space, including a new lift shaft.

Improvements have been made to some elevations in recent years but not all, and the works include window replacements where required and external cleaning. Internally the majority of mechanical and electrical services will be replaced, along with building finishes.

The block will be vacated for the duration of the works to temporary classrooms in a separate location. This report does not include the temporary space.

Programme Summary

Our Target Construction Programme (section 4.2) forecast dates are based on what we would consider a realistic delivery programme against which Highgate School might consider to add contingency in overall development planning terms, and set shorter targets when procuring the works.

As requested we have considered potential improvements by working through the critical activities and targeting earlier or shortened periods than shown in previous programmes.

Our programme remains around a month longer than the programme issued by Highgate School. We have however brought forward the start of main works to make better use of the summer break. Whilst it remains possible that works could be condensed to meet the one year target for decant it would be a risky strategy to follow without allowing for a contingency for not being able to move back in. The programme as it now stands offers some potential for further improvement if key activities can be reviewed and commenced in the 2020 Easter break.

A key point will be discovery and evaluation of unknowns as they arise. Refurbishment and structural adaption of buildings carries risks of additional or prolonged works due to unexpected finds. Building structures and services should be thoroughly explored and surveyed to the fullest possible extent that can be accommodated in the live environment (or possibly at Easter) before conclusion of designs.

Programme Periods

Our programme periods are based on the intricate nature of the works and the limited space for materials movements and plant. There will be works that can be approached with more vigour during periods of school closure and the final programme should take benefit of those occasions as far as possible. Care should be taken however to rely too heavily on holidays, as long delays can accrue if time slots are missed.

General Deliveries

Construction access to the Science Quad from Southwood Lane is reasonable for the scale of works involved, although reversing of vehicles in or out of the gate is inevitable. There is precedence for temporary removal of one of the gate piers which will improve vehicle access for the works.

Access via the rear gate to Garners Quad is to be avoided, except for occasional plant deliveries. We propose that a first-floor level gantry is constructed, serving the Southwood Lane elevation. Adoption of this proposal, and formal application for licences, will be subject to Contractor's choice when appointed. The old doors onto Southwood Lane could also be used for kerbside deliveries.

Cranage & Plant Selection

Construction of the new extensions will call for careful management and plant selection. We have offered suggestions of cranes and plant in the programme commentary but it will be essential that contractors are fully aware of the constraints at tender stage and are able to ensure that final designs are matched to methodology.

2.1 Risks & Mitigation

KEY RISKS / ISSUES	MITIGATION
Substructure	
Front extension foundation design (piles) and rig access to the site	Piling specialist input at an early stage to ensure the design is matched to a rig size and methodology that works with the limited access
Excavation plant and accessibility for excavation of rear extension	Consider methodology with design. Could be manually excavated, or min excavator from rear gate or through the existing building.
Below ground services diversions delay substructure construction	Early identification of works required with intrusive surveys undertaken as necessary.
Superstructure	
Structural interventions to the existing building (stairs, riser and plant support) could extend the programme or overload the structure	Early consideration of composite dead loadings and live construction loading & timescale.
Steel frame to Garner Quad extension currently programmed without craneage. Supply chain appreciation needed or risk of extended programme	Ensure clarity of site constraints in tender documents. Spider crane from rear gate could be substituted for our proposed method
Temporary works loadings may not work for existing structure.	Establish loading constraints with Engineer prior to tender returns. Ensure tenderers have a workable solution in their returns.
General	
Full consideration of on-site, school and public health and safety at all stages of planning and execution.	Detailed risk analysis of site operations.
A strategy to minimise disruption to the school, local environment and adjoining properties/owners.	Positive approach to neighbours – newsletters/site talks.
A methodology to secure the highest quality.	Samples/mock-ups prepared in advance and signed off.
Full consideration of both site and public health and safety at all stages of planning and execution	Detailed risk analysis of site operations
A realistic preconstruction period which provides the best input to the Client and Design Team	Ensure strategic programme and procurement route allows sufficient time to coordinate all aspects of the project
Provide above industry average facilities for the workforce	Make the site attractive to the workforce. Attract best tradesmen
Safe segregation of M&E services between site and occupied school areas	Early surveys and identification of services. Safe system of work throughout stripping out and construction phases.

KEY RISKS / ISSUES	MITIGATION
Logistics / LBH & Neighbours	
Demolition impact for noise and general disruption.	Contractor to ensure environmental monitoring is in place and a robust demolition plan is agreed with LBH and neighbours.
Delayed availability of Temporary Accommodation delays vacant possession of main works	Early alignment of VP schedule for main works with the procurement and erection of temporary classrooms. Contingency plan for late vacation.
Hours of Work conflict between LBH, neighbours and school.	Beware conflicting desires for noisy work times. Contractor to ensure pre-agreement before finalising programme.
Scaffold access over Alms house not agreed	Consider alternative access strategies and potential reduction in scope of work as a contingency plan.
Welfare location unavailable	Make a contingency plan for the project that meets programme strategy and dates
Oversailing agreements restrict mobile crane operations	Review crane positions and make early approaches to neighbours if required
School Access impacted by construction	Early agreement of delivery strategy with school and regular review with contractors
Continuity of Building Services to school and neighbouring property.	Ensure before services are terminated that all systems are truly separated and will continue to function.
School decant programme clashes with contractors initial set up in the Science Quad	Agree vehicle slots for school use separately to contractor. Agree phased parameters of closing in hoardings with due attention to CDM requirements.

2.2 Target Programme Considerations

As requested by Highgate School we have reviewed our initial findings in order to explore potential programme savings to ensure completion of works in time for the start of Autumn term 2021.

Critical Activities

Whilst our programme is outline, limited by the current level of design the critical path can be identified as being:

- Site set up
- Preparation (stripping out and opening up unknowns)
- Structural interventions including forming risers and service routes
- Installing new services
- Commissioning and setting to work

The creation of new space in terms of the front and rear extensions is believed to be more predictable and therefore less critical, provided it is managed properly.

Potential Programme Savings

In the following table we have Identified potential improvements to critical activities to target earlier completion and to ensure term start date is met. These are categorised as:

- Discovery – de-risking of the programme by carrying out extensive and intrusive surveys of services and structure ahead of the main works
- Early Works – Things that could be brought forward along with opening up works to ensure that the start of main works is meaningful
- Main works programme periods – shortening of durations, either due to improved knowledge or as targets to achieve, plus potential contingency planning

Target Programme

We have factored the results of the table into a Target Programme which is included in section 4.2 with our first drafted programme.

This indicates a theoretical saving of 8 weeks, by using Easter and half term holidays to “get ahead” with opening up and establishing site, and shortening main works targets accordingly.

Those early works might equally be achieved in part by using evenings and week-ends, combined with the school’s regular maintenance contractors.

CRITICAL PROGRAMME ISSUE		MITIGATION			
ACTIVITY	CURRENT DURATION	SCHOOL ACTIVITY	DISCOVERY	EARLY WORKS or ENABLING PACKAGE	MAIN WORKS PROGRAMME
School Decant Space Needs to work with term and holiday periods. Risk of clash with contractor’s set up with vehicles wanting to use the same space. <i>Early availability of Decant space may provide some benefit</i>	6 weeks	Clear non-essential material early to shorten period Plan to use different routes when contractor starts, so contractor has the Science Quad while Removal Company has North Road and Garner Quad perhaps.			
Establish Site	2 weeks			Start works in Easter break, half term or weekends: ➤ Remove Gates & Alter Front Gate Piers ➤ Clear external furniture ➤ Probe hoarding locations and erect some posts ➤ Set up Office/ Welfare space	

ACTIVITY	CURRENT DURATION	SCHOOL ACTIVITY	DISCOVERY	EARLY WORKS or ENABLING PACKAGE	MAIN WORKS PROGRAMME
Make Safe Services Risky item, until services are traced and identified	2 weeks		Establish early surveys and recording of all services routes out of hours. Open up ceilings and ducts and ensure there is knowledge of what feeds which area.	Use Easter Break, half term or weekends for: ➤ Intrusive surveys ➤ Identify, record and label services ➤ Remove redundant services where possible ➤ Make good fire protection to allow school use to continue	
Protect Live Services This programme item assumes that there will be live services remaining in place through the building site in order to feed live areas of school. Ideally they would be terminated or diverted, but where that is not practicable they work be securely encased and remain in position (subject to a risk assessment).	2 weeks		Early services surveys should identify which pipes and cables might need to continue to supply live areas. Subsequently a plan to divert or encase would be drawn up.	Use Easter Break, half term or weekends to: ➤ Identify services as above ➤ Install diversions if time permits ➤ Install physical enclosures and signage if time permits ➤ Complete a design of what needs to be implemented early in the main works programme	Benefits from clearer understanding of requirements at commencement of the works.
Soft strip internally	4 weeks	Early disposal of non-essential equipment and fixtures. Ensure identification and clearance of hazardous waste and chemicals from stores (Discovery of un-labelled bottles once the contractor has started cause disproportionate delays!) Identify any rooms or spaces that could be emptied and stripped a term or half a term early	Early intrusive inspections to fully understand the scope of work including asbestos removal Use empty rooms to explore and improve knowledge of the structure and services	Use Easter Break, half term or weekends to: ➤ Remove fixtures and fittings from redundant labs or rooms.	Benefits from any volume that is removed early and remaining scope is clarified from the learning accrued
Crash deck/ Break Out Floors (New Stair) Early structural interventions will be the key to opening up the building and progressing through to new structural works uninterrupted.	2 weeks + 4 weeks				Shorten the period by targeting quicker start and shorter duration based on better knowledge Use the knowledge derived from early opening up to progress the

					design of new structural elements and take surveys.
New Riser(s) As above, preparing for new services distribution is as important as building the new space (Programme not fully quantified at this stage given that more detailed design is needed to fully understand scope and difficulty)	8 weeks		Use early investigations of structure and services to better understand what's needed in the final design.		Design structural solutions that have flexibility of components, and allow details to be finalised as work progresses.
Services distribution and services second fix (Programme not fully quantified at this stage given that more detailed design is needed to fully understand scope and difficulty)	12 weeks + 12 weeks		Use early investigations of structure and services to better understand what's needed in the final design.		The earlier that services can be sized and their routes identified, the earlier components can be ordered and deliveries committed.
Services commissioning & setting to work The current, outline programme identifies commissioning as the main critical activity to completing the programme but as more detail is added the critical path will encompass all of the fitting out activities to varying degrees. (Programme not fully quantified at this stage given that more detailed design is needed to fully understand scope and difficulty)	12 weeks + 4 weeks	Consider contingency options that might be available should the programme overrun Autumn term start and what the impact might be: ➤ Can school continue to use temporary space for a half or full term? Consider the minimum time needed for decant ➤ Factor in the implications of temporary space – hire cost? Availability for next project? ➤ Would partial occupation be workable at all (if plant and commissioning can be configured to achieve it)	Use early investigations of structure and services to better understand what's needed in the final design.		Set early targets in tender and contract programme as far as possible and monitor progress tightly. Include the need for a commissioning strategy and programme to be prepared early in the construction process Request progress reporting with forward predictions of key milestones of watertight, power on, heat on and commissioning such that contingency plans can be kept under review.

3.0 Programme Assumptions

- Temporary Accommodation set up and ready to meet decant dates
- Beneficial use of permanent lift when hoist is removed.
- Progressive installation of rain water pipes and hoppers.
- New external cladding will comprise stick system curtain wall/ rendered panellised system. Inner skin assumed as Metsec or similar SFS system to allow early progress of fit out with outer skin progressing to non-critical programme.
- Logistics proposals acceptable to LBH for deliveries and cramage.
- Cladding and fit out materials selection can be procured in the time allowed.
- Fire strategy will be achievable to accommodate live school areas.
- Programme allows for removal of normal levels of asbestos expected for buildings of this age and type. Full R&D surveys to establish content and allow formal notices to be served before site start.
- No allowance for removal of contaminated spoil.
- All necessary permissions in respect to party wall agreements will be obtained to allow the programme to proceed as drafted.
- Programme is based on a working week Mon – Fri 08.00 to 18.00, Saturday 08.00 to 13.00.
- Planning & reserved matters can be dealt with within the proposed programme parameters.
- Noisy structural alteration works are allowed to be carried out in line with normal local authority timescales, i.e. minimum of four hours per day.
- Vacant possession of the site means “all of the site” and no access or constraints will need to be considered other than those which are directly associated with the works. This also means that all loose FFE will have been removed.
- Occasional access is available from the Caste Yard gate for plant delivery.
- We have assumed that the extent of service terminations/ isolations/reconnections required within the existing spaces, are restricted to those services affected by the proposed works. We have made no allowances for either the upgrading, uprating or making good which would be associated with such works.
- No allowance in the programme for any “down-time” associated with environmental matters.
- Crane licenses if necessary for the over-sailing of buildings or highways will be granted.
- Procurement route has not been assessed. Start on site dates are as advised by Highgate School.
- Full rights of access assumed from Southwood Lane and Castle Yard (occasional).
- Refurbished building to be served from existing utility supplies or, at worst new connections to mains in the immediate vicinity. No allowance for external diversions.
- Existing sewer and drain connections assumed to be adequate for the new project.
- Highway, footway and Science Quad are capable of taking the temporary vehicle and crane loading.
- All statutory service providers to deliver services to allow the programme to proceed as drafted.
- Piling (front extension) to be undertaken from ground level using a rig that can access the Quad.
- Frame is steel construction with metal deck/ concrete floors
- Roof structure to be metal deck plus traditional roof finishes.
- Stairs to be lightweight steel treads (Stairmaster or similar) with pumped concrete.
- No extensive tank construction or rainwater attenuation measures allowed for.
- No allowance for discovery and removal of munitions.
- No allowance for archaeological investigation.
- Fixed lab furniture included in contractors scope. Loose furniture and FF&E to be by school separately.

4.0 Science Block

4.1 Programme Commentary

4.1.1 Site Context

The Science Building is the central part of the Highgate School “island site”, bounded by North Road and Southwood Lane. Two enclosed quads border the building, Science Quad to the south and Garner to the north side.

The Science Building is central to school activity and, apart from housing classrooms and management offices, is a major thoroughfare for school activity. The proposal is to vacate the live classrooms and functions to temporary accommodation for the duration of the works. An access route is to be kept open for staff and pupils through the ground floor of the building, segregated into a protected route.

Vehicle access is possible into the Science Quad. Vehicle size is limited but it appears suitable for the scale of the envisaged works. One or both of the existing brick gate posts should be temporarily removed for easier access for lorries. Occasional access could be made to the Garner Quad from the rear gate from Castle Yard. The school have expressed a wish that the gate should only be used when essential, and not for general material deliveries.

The Southwood Lane elevation offers potential additional access. That elevation is to receive new windows and cleaning, for which a full scaffold will be needed. We propose that the scaffold incorporates a loading gantry at 1st floor level where vehicles can be offloaded from kerbside. There are also two doorways onto the Southwood Lane pavement (currently sealed and unused). One or both of these could be opened up for smaller, hand carried or trolleyed goods

Adjoining Alms Houses form the boundary of Garner Quad. Works to the north elevation of the Science Building will necessitate a scaffold bridging the neighbour’s property for which oversailing agreement will be required.

The west elevation (North Road) is largely unaffected by the works and offers no usable access. Scaffolding is not needed there.

The Science Block project involves the refurbishment of the existing laboratories and associated spaces, including the Link Building to the West side of the Science Quad, together with two extensions. An extension of the first and second floors into the Garner Quad to the North side of the block will allow better special use for laboratories. An extension of basement, ground, 1st and 2nd floors into the Science Quad to the south side improves entrance and circulation space, including a new lift shaft.

Improvements have been made to some elevations in recent years but not all, and the works include window replacements where required and external cleaning. Internally the majority of mechanical and electrical services will be replaced, along with building finishes.

The block will be vacated for the duration of the works to temporary classrooms in a separate location.

4.1.2 Logistics and Transport

Given the context of the site and the nature of the proposed works, deliveries to site and methods of materials handling will require detailed planning and consultation with the local authority and TfL, particularly for larger vehicles. Access to the science quad is limited to small vehicles only, and the design of the buildings should progress with due consideration of the limits on space, such that many components can be delivered in small, manageable loads.

Plant and craneage is also a consideration for the piling, basement and superstructure elements, where the design must be matched to methodology and plant sizing.

4.1.3 Site Establishment & Commencement

Project Commencement is targeted to make use of the summer school holidays to prepare the site for the works.

Completion of the temporary classrooms needs to be assured in advance of the break so as not to delay decant and site preparation operations. We assume that the moving of school equipment is outside the construction contract and to be managed by school staff and removal contractors. Vehicles will need to access the Science Quad for loading away of goods and waste, and the period should be carefully programmed to ensure that both removers and incoming contractors have time and space to complete their works.

Incoming contractors will need to ensure that critical works to segregate the construction site from the continued use of school are fully completed in time for the new term. This will include hoardings, services isolations and separation, and the construction of the protected access route. They will also need to establish site welfare and office accommodation, ensure temporary services are in place for the site, and that life safety systems and wayfinding are all in place for the return of the school.

As contractors take possession of the building, the external space or sections of “emptied” area it will be important to record responsibilities and control of individual areas. The Principal Contractors duties under CDM are more onerous than those on maintenance and removal companies and they must be in a position to enforce site rules on their staff and any others entering site space.

We understand that an asbestos register exists and that relatively small levels of asbestos are present in the building. If not completed beforehand a full Refurbishment and Demolition survey should be carried out as soon as the building is vacant, with licenced contractors being appointed for removal, and formal notices submitted in due time to meet the start on site dates.

At commencement the buildings need to be made safe and secure to a standard that meets CDM regulations. Remaining live services in the buildings would be made safe and temporary power and water installations installed. It appears that main

incoming gas and electric supplies will remain live within the “site” area. Whilst these are away from the larger structural interventions the live routes must be thoroughly traced and physical protection added if they remain in working areas.

Redundant services must be traced, isolated and identified as safe before temporary works or stripping out get underway. Fire and smoke detection should be adapted for site conditions, and to maintain live school areas.

Hoardings and gates will be erected to the Garner and Science Quads. The protected route through the building should be designed to meet the appropriate fire standards and needs to be fully constructed before the school term starts. Each end of the tunnel should be protected by a scaffold crash deck which would best be constructed in advance of the main scaffolding.

A number of options exist for site accommodation and should be decided upon before tender. Possible locations include:

- Use space inside the buildings being refurbished. Perhaps in the link building. This has the benefit of being cheap and quick to set up but hampers fit out progress and requires one or more moves.
- Cabins in the Science Quad would be possible to meet some of the space requirement but probably not all. The space may be better left for logistics and material storage use which would be more beneficial.
- Space is believed to be available in the Tabernacle building on the opposite side of Southwood Lane. If used then it might be combined with a small cabin in the quad to ensure that site supervision is maintained in the immediate site area.

4.1.4 Early Works and Stripping Out

Hoardings outside the school property will be pre-agreed with the London Borough of Haringey and neighbours and subject to licence application in advance.

Traditional scaffolding will be required to all elevations of the Science Building and Link, except to North Road (no works there) or to the west elevation of Biology (where the front extension is to be built. Scaffolds should not be an urgent item to erect as the early priority will be on segregation and readiness for term start.

External scaffold erection should be programmed to follow the initial site set up, in parallel to stripping out starting.

Scaffolds are to serve façade treatments and to provide access and environmental protection for demolition. They should be fully sheeted with Monarflex or similar sheeting which assists with preventing dust and noise escape whilst presenting a more acceptable view of the site to school and neighbours.

A small platform goods hoist will be required and should be erected in the Science Quad together with a Haki stair for operatives’ access. We propose that a loading gantry be included in the scaffold to Southwood Lane, with a lifting beam to facilitate direct offloading of lorries, to reduce the extensive use of the quad.

Once the site is established and services isolations in place, the soft-strip can commence. Materials will be moved in bins to skips or lorries located in the Science Quad, or Southwood Lane.

Materials arising from upper floors would be placed into bins at source and then taken down to the quad, utilising the goods hoist, and loaded into a compactor truck or skips.

Once soft-strip is far enough advanced the hard demolition would commence as described in the following sections. Access should be sufficient to allow the use of Brokk robot machines with shear and grapple attachment or alternatively simple manual techniques. Materials would be moved to skips in the Science Quad using bins or loaded to lorries in Southwood Lane.



BROKK ROBOT

4.1.5 Garner Quad Extension

The constraints dictating the choice of plant and methodology are the enclosed site and limited access. Our methodology is based on the smallest plant, or manual alternatives. Once the building is stripped out a route through from the Science Quad to the rear could be made available, reducing the need for plant to access from the rear gate.

The proposed strip foundation for the new extension could be small enough to be excavated entirely by hand. Alternatively the mini excavator shown here retracts to under 1m wide and weighs around 1.5 tonne. It could be delivered through the building with only minor temporary works to accommodate it.



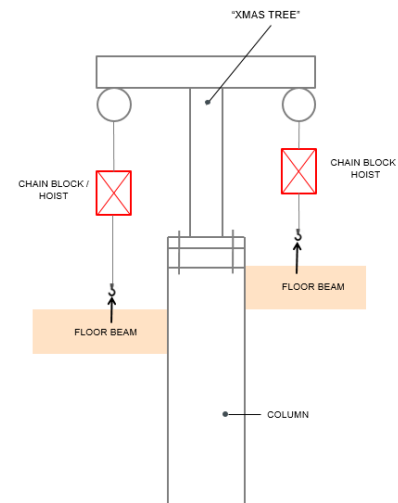
MINI-EXCAVATOR

The foundation and any associated local drain diversions can be constructed while stripping out continues inside and in advance of scaffold erection.

Once the inside is stripped and the foundation in place internal propping and external scaffold can be erected. We envisage that the external scaffold can be adapted to serve as access as well as support for temporary needles, as shown on our sequence diagram overleaf. The contractor should consider bringing in new permanent steel for the wall support *before* the propping is erected – to ensure it can be manoeuvred into place.

Once supported the old façade wall can be demolished in to the building and debris removed in bins to the front quad. New supporting steel is then lifted by block and tackle using the scaffold and temporary works for support.

Other methods of manual erection could be employed including the “Xmas Tree” system where the new permanent columns are adapted to lift the beams into place:



“XMAS TREE”

With the new steel placed, packed and load transferred the external scaffold is adapted to be used to pull the new extension steelwork into place. Alternatively the scaffold could be removed and a small spider crane brought in from the rear gate, although that seems an unnecessary expense for the small amount of steel to be erected. The steel itself would be delivered via the front and trolleyed through the ground floor.

Internal propping can be dismantled when no longer needed. Metal deck floors would be constructed top down, dismantling the scaffold as they complete. A new external scaffold would be erected for access to build the façade.

We assume that the façade will be small components erected manually. Ideally the inner skin would be a Metsec or similar Structural Framing System, incorporating the glazing or with temporary weatherproofing such that the fit out can proceed while the external cladding finishes continue.

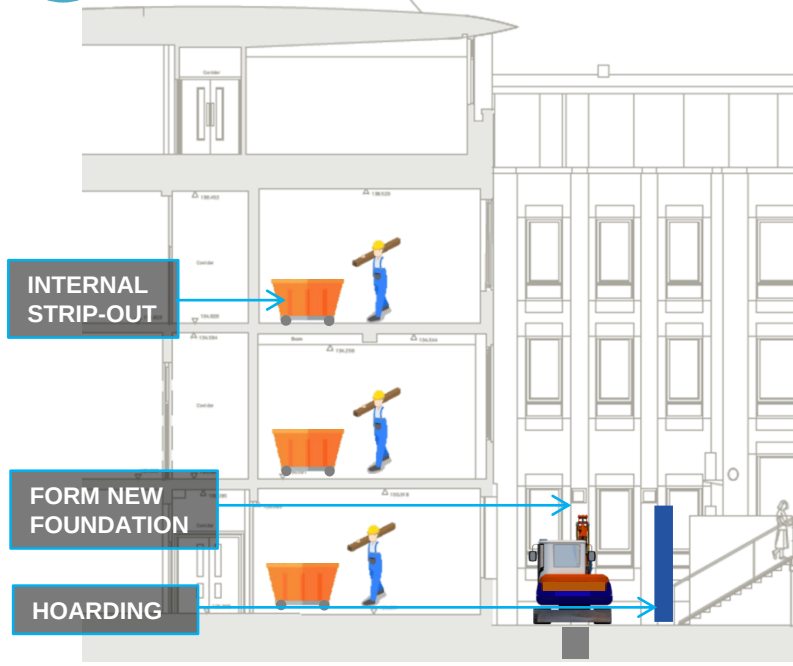
Finally the scaffold is removed and the external works completed by hand or using small machines.

SPIDER CRANE ALTERNATIVE FOR EXTENSION STEEL

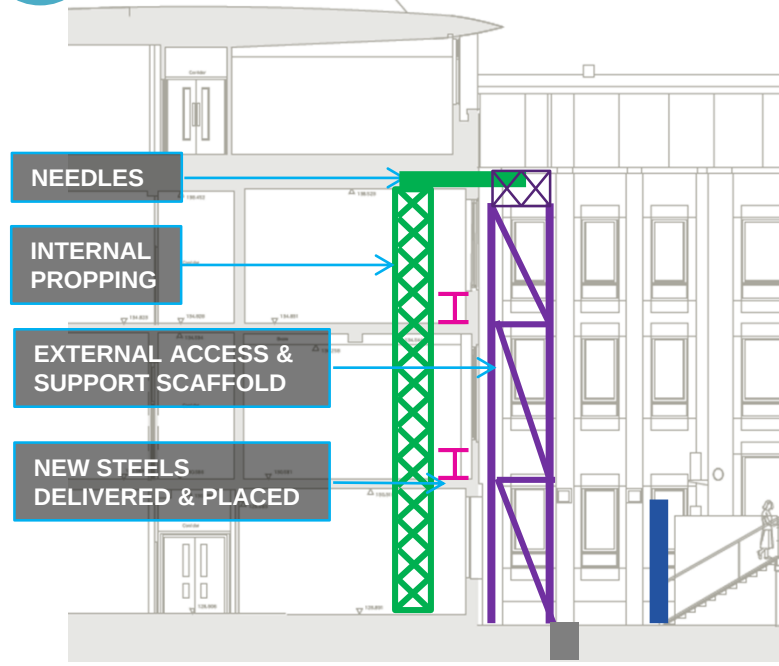


Please refer to drawing BSB-HS-002 – Rear Extension Sequence.

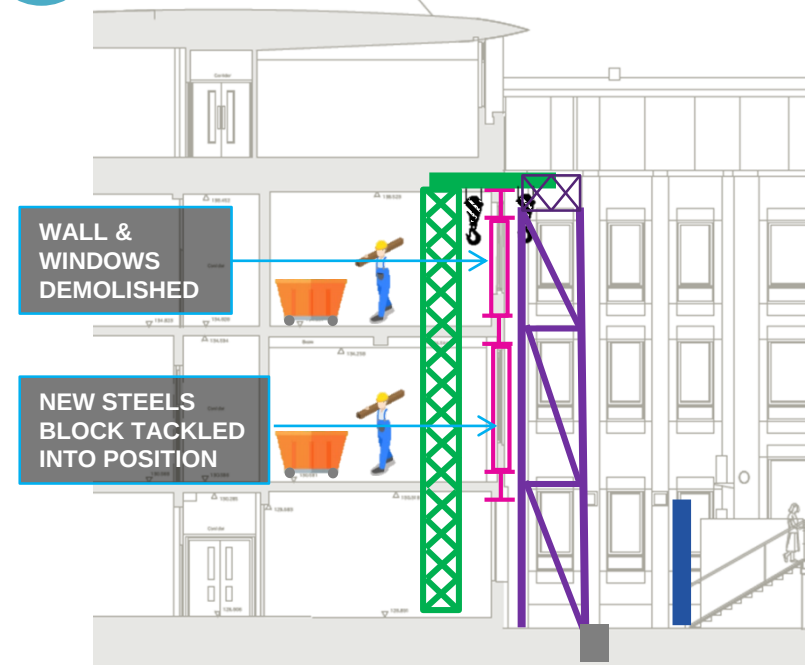
1 Prepare



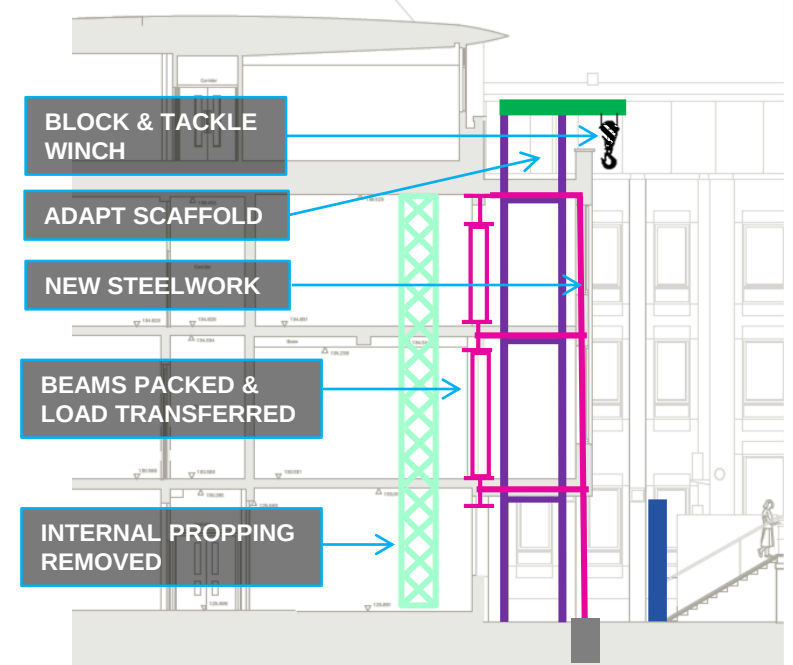
2 Prop



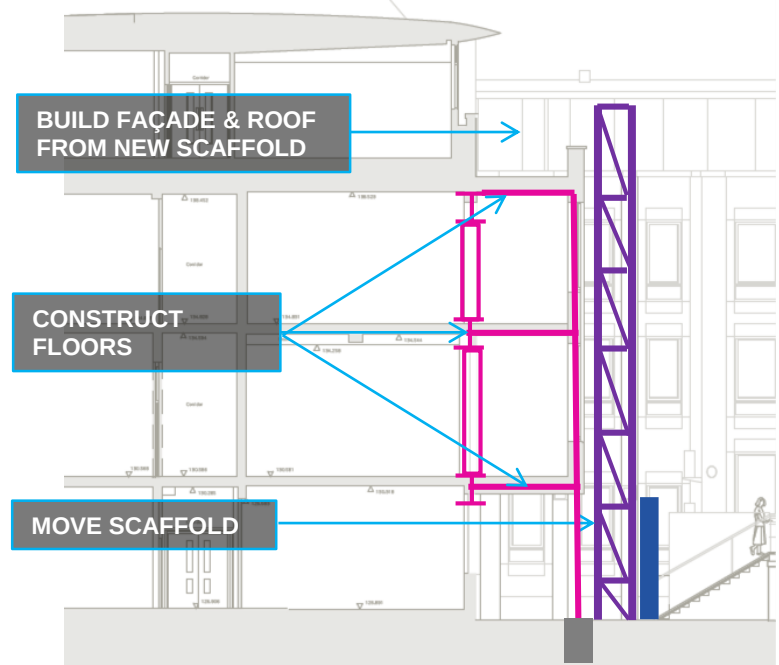
3 Demolish Façade / Install Steel



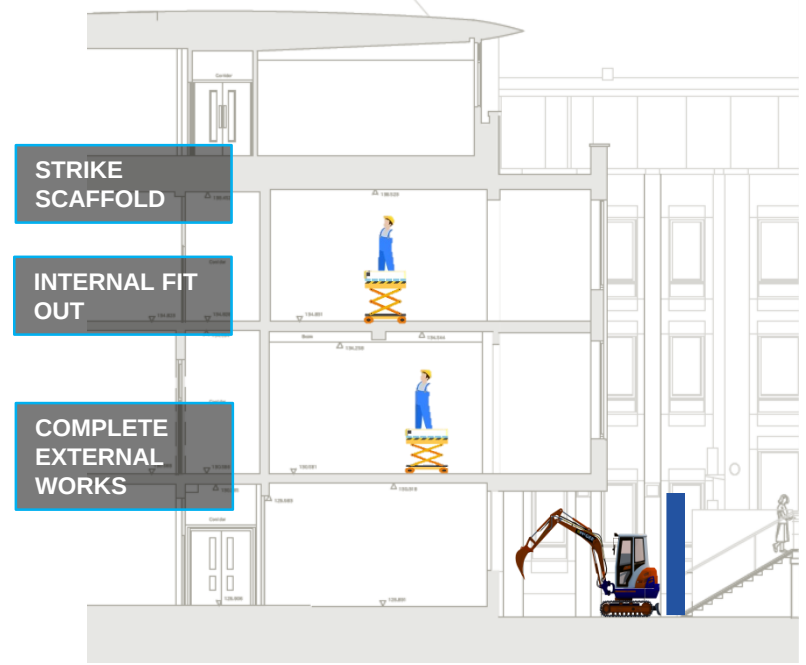
4 New Extension Structure



5 Envelope



6 Fit Out



PROJECT: Highgate School | Science Project
CLIENT: Highgate School Estate
TITLE: Rear Extension Sequence

DRAWING NO.: BSB-HS-002
REVISION NO. & DATE: Rev 0 – 11/07/2018
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4.1.6 Science Quad Extension

The Science Quad extension will be the most critical piece of the construction, as it is the largest element of work and has an effect on overall watertightness and fit out.

Internal strip out should be focused on clearing the areas of the new stair, old stair to be removed and corner wall. An external demolition scaffold should be erected in that corner in parallel to internal strip out. All of the demolition should be undertaken early in the programme to clear the way for new construction.

Underpinning the existing wall will be a slow, manual process and should be commenced as soon as possible. Works to the south end are sufficiently removed from the demolition area to get underway early. Underpinning can't be completed until the demolition completes and the corner scaffold is removed.

Piling would be undertaken from ground level using a small rig that can be driven through the entrance gate, similar to the rig in the photograph here. We estimate that 4-5 piles per day would be achievable. Arisings would be stock piled for removal by skip or lorry. Concrete deliveries would be by ready mix truck to the quad and placed directly.



**CF3 RIG,
2.2M WIDE, 11 TONNES**

Machine selection for basement excavation should be the biggest machine that can be got in. Excavation to underside of raft will proceed when piling and underpinning are clear, with temporary propping as required.



**KOMATSU EXCAVATOR,
2.4M WIDE, 8 TONNES**

We have allowed only a short period for below slab services before the raft is constructed. Large scale diversions of drainage have been suggested as possible and more time should be allowed if this transpires as necessary.

Stair trimming steel and new landings should proceed while the basement is built as the stair is most accessible before the new extension is built. The stairs should be as light as possible since the roof level is remaining in place and lifting will therefore be difficult. We envisage stair sections being delivered via the quad, lifted over the basement and pulled up through the new well from the top level. Alternative access could be possible through the first floor from the loading gantry, in which case the programme criticality between stairs and extension is reduced.

Stairs could otherwise be in-situ concrete. Slow to form but the site doesn't suit the lifting of heavy pre-cast flights.

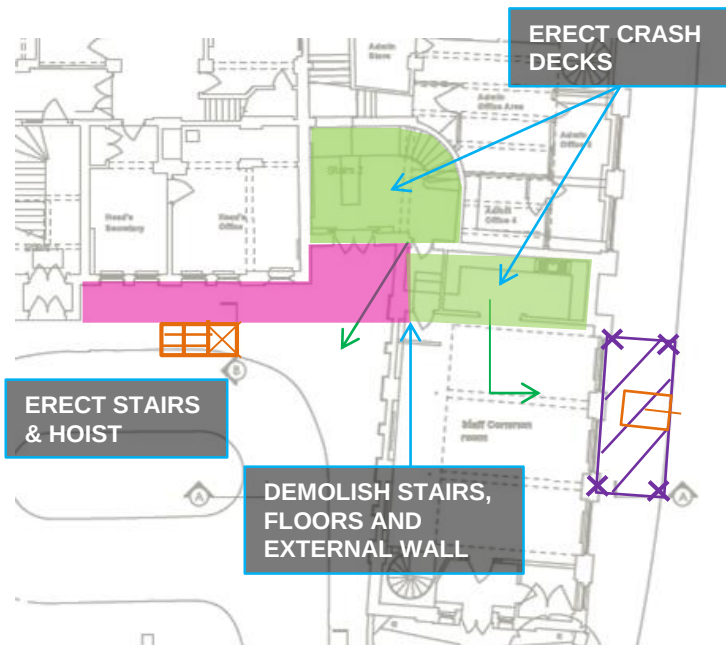
The new steelwork frame should be possible by small mobile crane operating in the front quad. Steel member should be manageable with the emphasis on crane manoeuvrability rather than capacity.

Steel for both extensions should be designed to allow small deliveries on rigid vehicles that can access the quad.

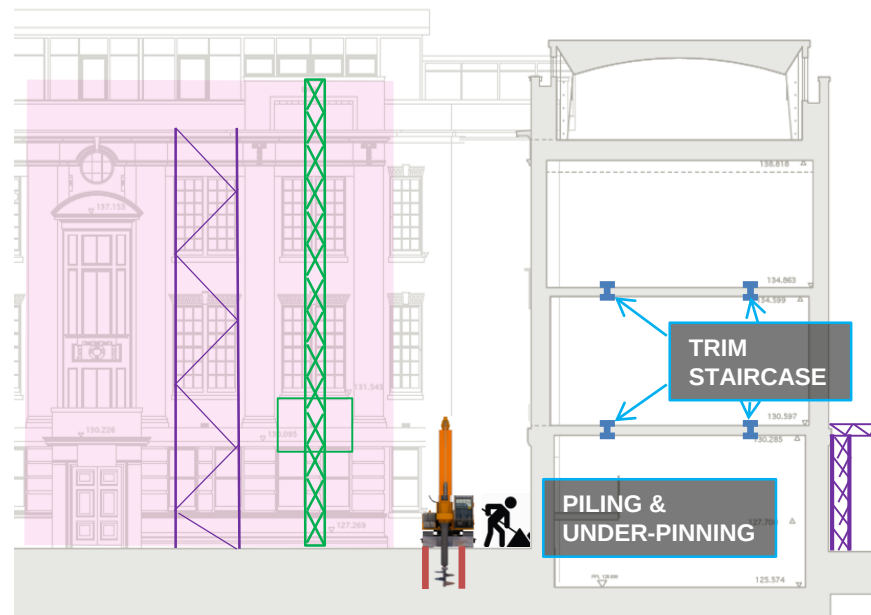
Metal deck should be placed by the mobile crane and concrete floors pumped from the quad. Then an external scaffold will provide access for erection of cladding.

Please refer to drawing BSB-HS-003 – Front Extension Sequence.

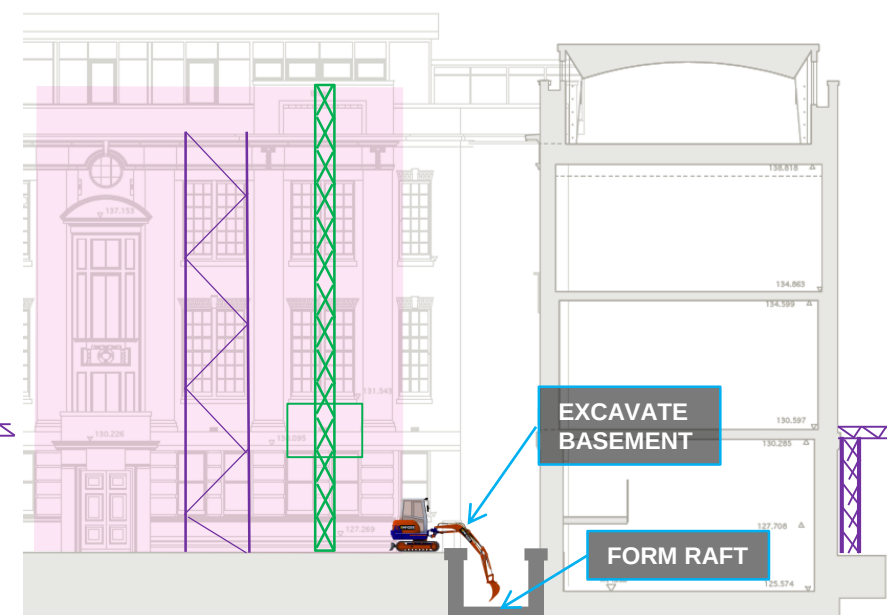
1 Demolition



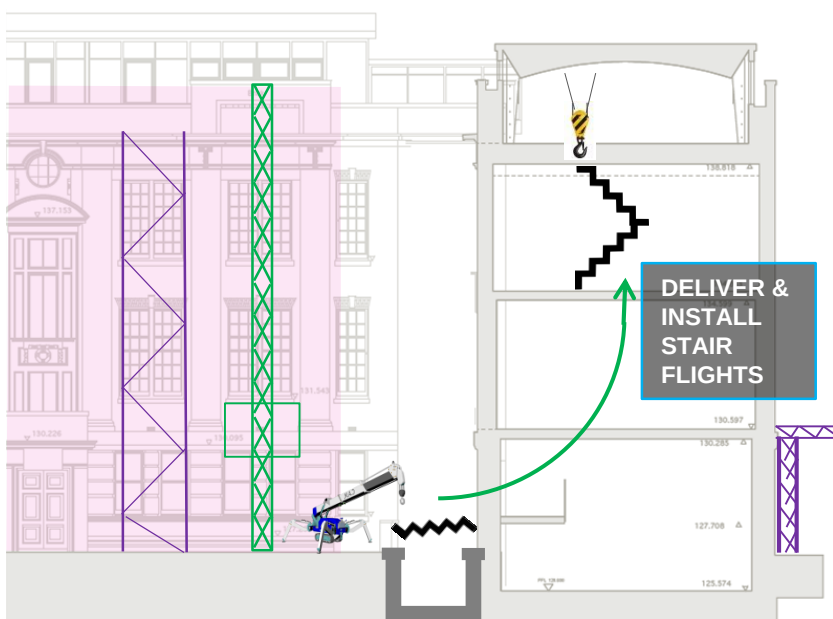
2 Foundations



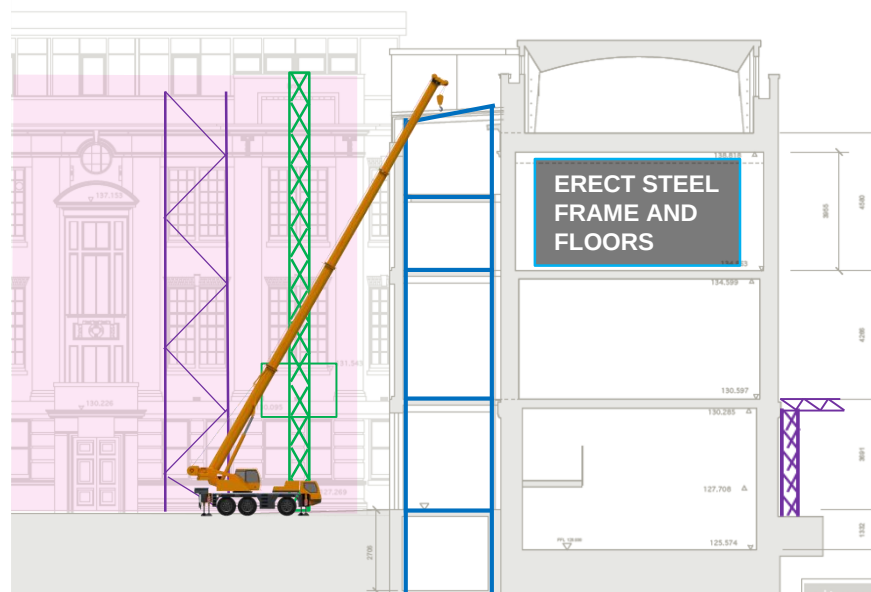
3 Basement



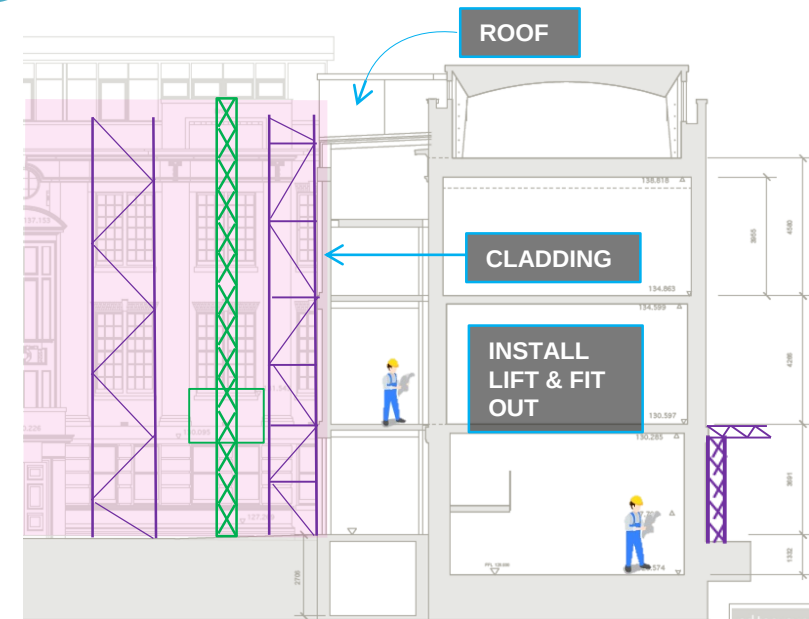
4 New Stairs



5 Frame



6 Envelope & Fit Out



NOT TO SCALE



PROJECT: Highgate School | Science Project
CLIENT: Highgate School Estate
TITLE: Front Extension Sequence

DRAWING NO.: BSB-HS-003
REVISION NO. & DATE: Rev 0 – 11/07/2018

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4.1.7 Existing Building Fabric and Envelope

We have programmed new facades on the basis of the inner skin being SFS that can be erected quickly from the new floors. Existing façade refurbishment is planned to ensure that any window replacements are similarly early such that the whole building achieves watertight in due time for the fit out. Window openings would either be fixed to the SFS or temporarily weathered to allow fitting out to start as soon as possible.

Brickwork would then follow from the external scaffold, using pre-mixed mortar delivered in tubs daily. If the inner skin was traditional blockwork there would be a programme increase, albeit not major, given the scale of work involved to achieve watertight in due time to allow services and fit out to proceed.

4.1.8 M&E Services

We understand that no significant new utility connections are required and that the new facilities are served from the existing incomers.

Key issues for the M&E sequence are to have the risers and main plant in place as soon as possible and to work away from those through the floors. With the extensions predominantly watertight (roof finishes and SFS skin in place) services distribution up the risers would take place.

Lift installation appears straightforward and we have sequenced installation to start early (subject to design and fabrication). Beneficial use of lifts should be allowed once ready to allow earliest removal of the external hoist and infill of the final windows.

4.1.9 Fit Out Works

Internal fit out is assumed to be standard school finishes incorporating hard wearing materials and detailing with the minimum of frills. That is to say, hard ceilings and exposed service spines rather than suspended ceilings for example.

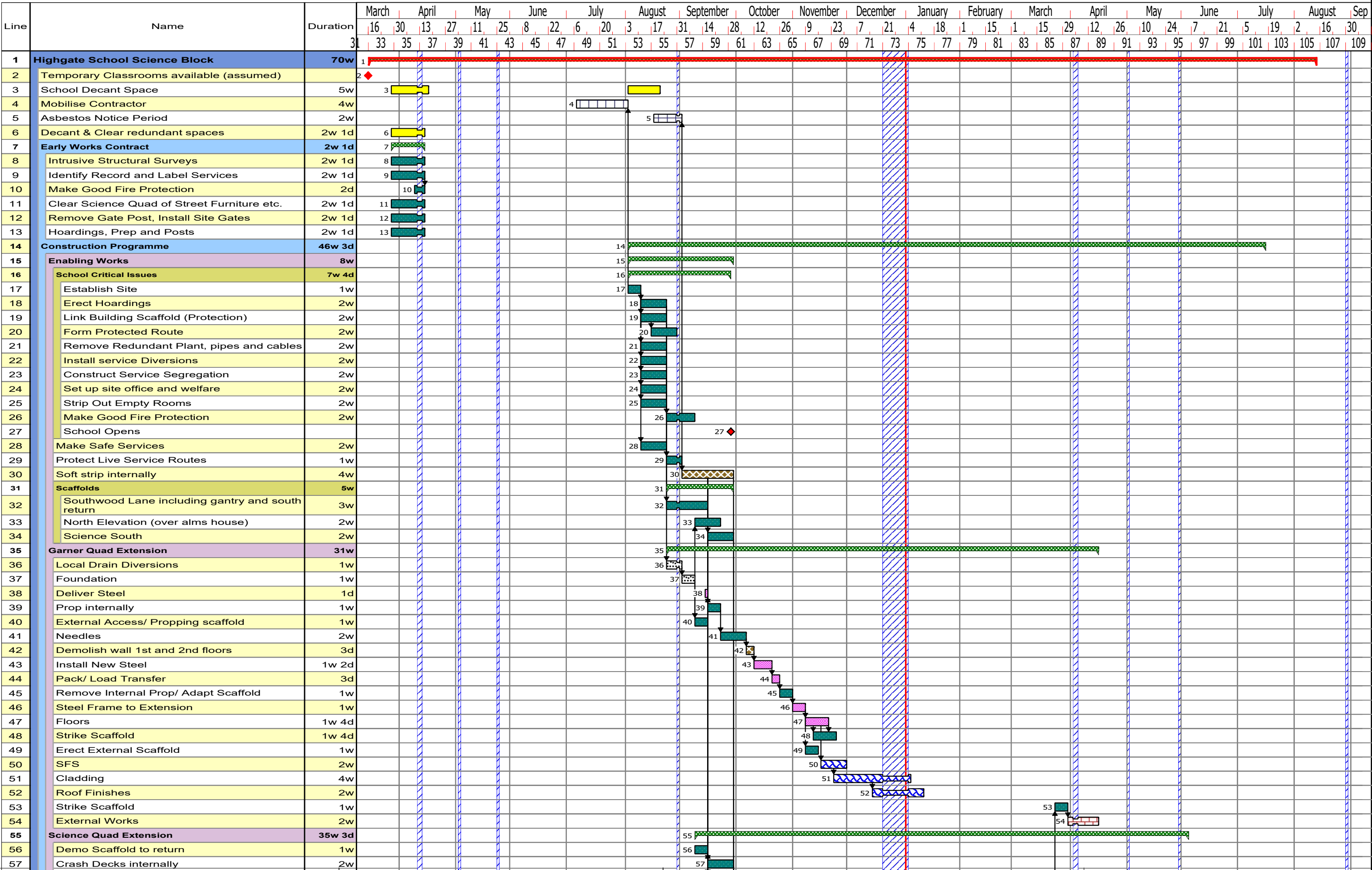
4.1.9 Finals & Handover

We have allowed for a 12 week commissioning period for individual services followed by 4 weeks of whole building testing beyond physical completion of the works to prove and complete the building. This should mean there are minimal if any defects.

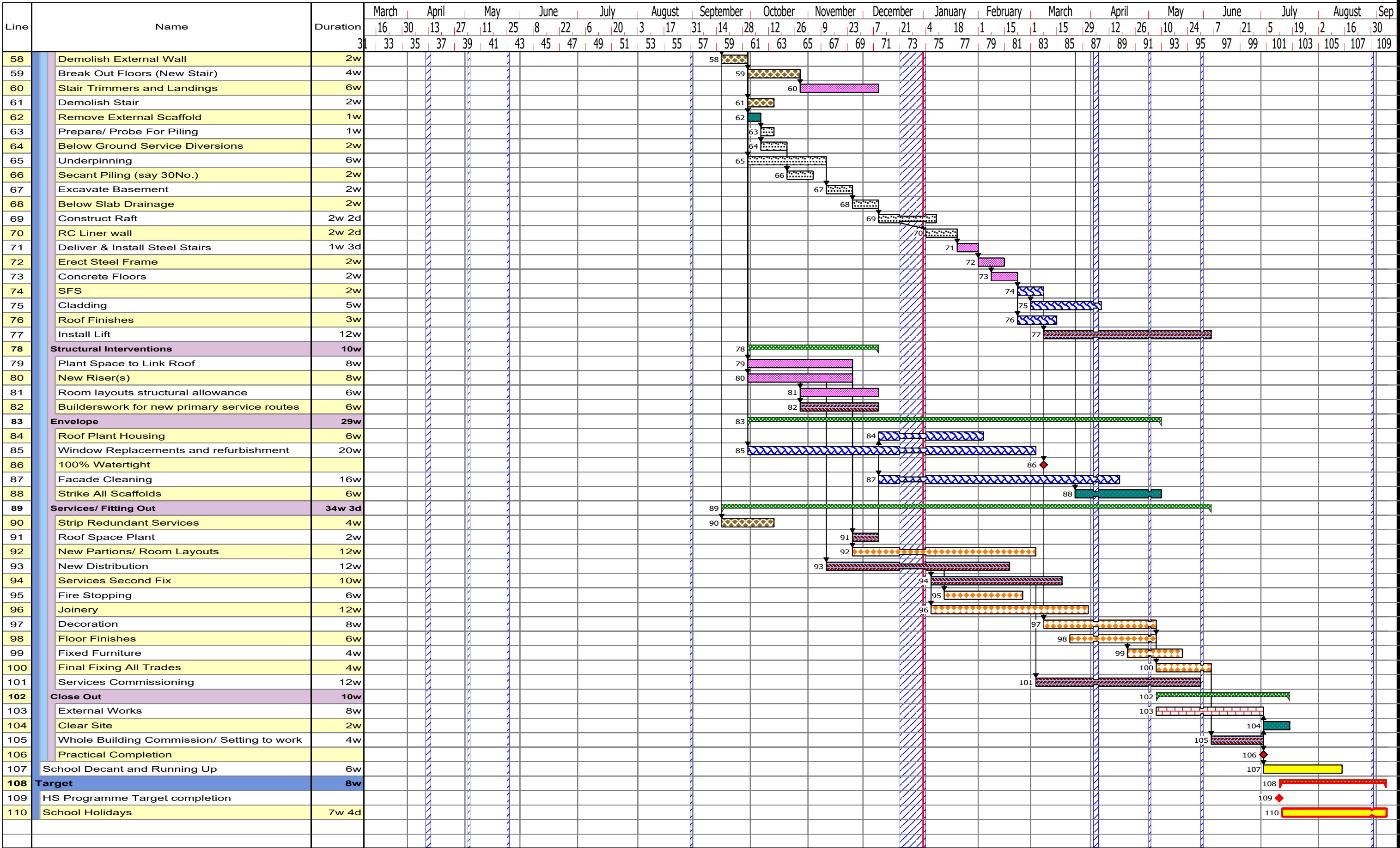
4.2 Programme

Please refer overleaf to the Target Construction Programme.
Revision B.

Highgate School Science Block: Target Construction Programme

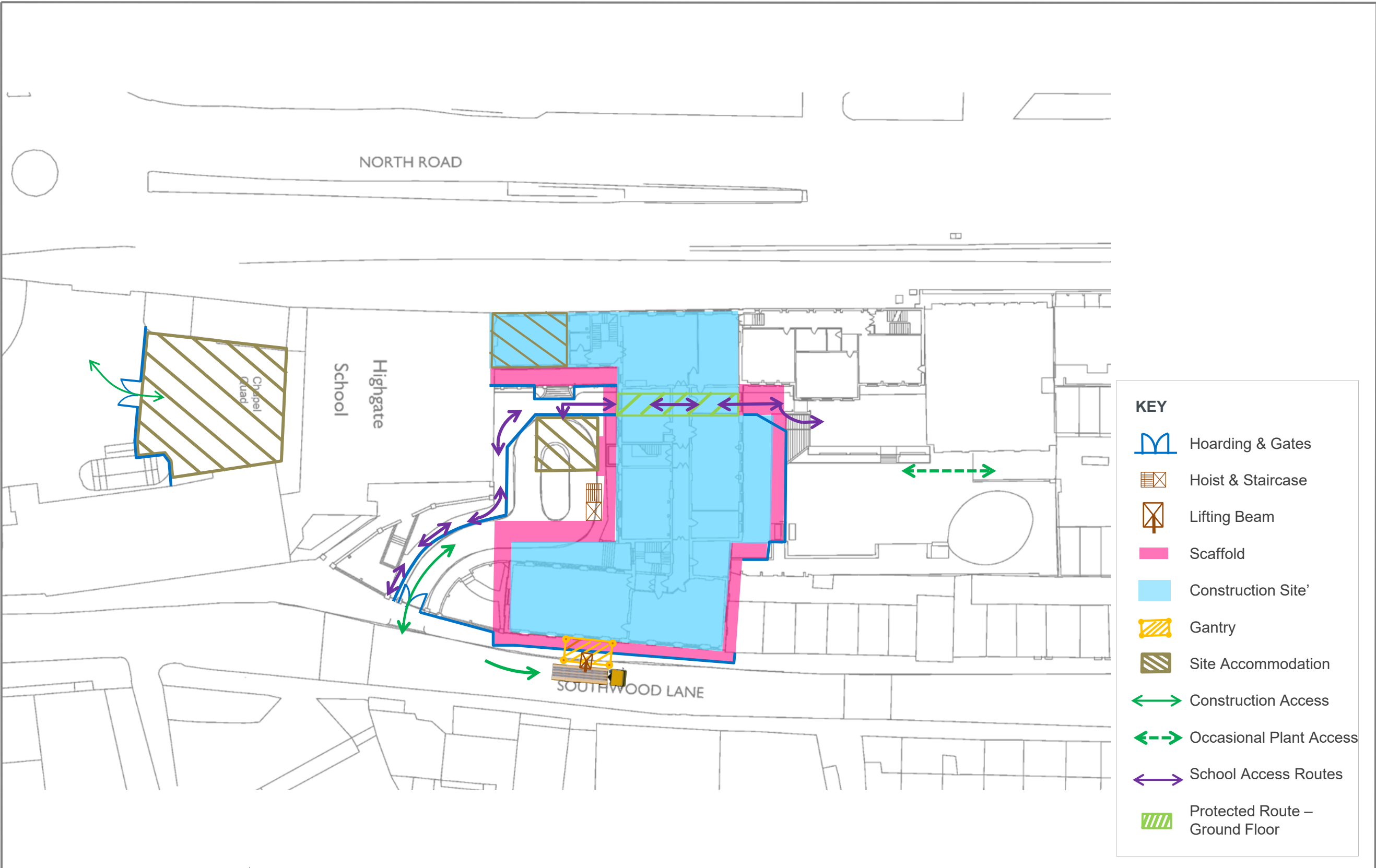


Highgate School Science Block: Target Construction Programme



4.3 Site Logistics Drawing

Please refer overleaf.



PROJECT: Highgate School | Science Project
CLIENT: Highgate School Estate
TITLE: Logistics Plan

DRAWING NO.: BSB-HS-001
REVISION NO. & DATE: Rev 0 – 10/07/2018

5.0 Site Waste Management

The Contractor will use working methods that minimise waste. Any waste arising from the site will be properly categorised and dealt with in accordance with appropriate legislation.

Opportunities for re-using or recycling construction or demolition waste should be explored and implemented.

The Contractor will carry out the works in such a way that, as far as is reasonably practicable, the amount of spoil and waste (including groundwater, production water and run-off) to be disposed of is minimised.

The disposal of all waste or other materials removed from the Site will be in accordance with the requirements of the Environment Agency, Control of Pollution Act (COPA), 1974, Environment Act 1995, Special Waste Regulations 1996, Duty of Care Regulations 1991 and the Waste Management Regulations 2011.

In general, and in accordance with the principles of the UK Government's 'Waste Strategy 2010', a principal aim during demolition and construction will be to reduce the amount of waste generated and exported from the Development site.

This approach complies with the waste hierarchy whereby the intention is first to minimise, then to treat at source or compact and, finally, to dispose of off-site as necessary. All relevant Contractors will be required to investigate opportunities to minimise and reduce waste generation, such as:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.
- Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste.
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials.
- Re-use of materials wherever feasible (e.g. re-use of crushed concrete from demolition for the piling platform; re-use of excavated soil for landscaping).
- The Government has set broad targets of the use of reclaimed aggregate, and in keeping with best practice, Contractors will be required to maximise the proportion of materials recycled.
- Segregation of waste at source.
- Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing). Our expectations in this regard are shown in the table opposite.

The Contractor's CEMP is to include the full environmental management requirements and Site Waste Management Plan.

Material	Target	Probable Location
Architectural salvage	100% re-used	Several architectural salvage companies in London.
Metals	100% recycled	Every effort will be made to recycle these materials on site with any surplus being taken to waste transfer station.
Hardcore (brick/block/concrete etc.)	100% recycled	To be crushed off site and reused as inert fill.
Excavated material/clay etc.	100% recycled	100% processed for re-use as fill (subject to analysis).
Timber	Up to 85% re-used The amount re-used will depend on the material	We will attempt to salvage any re-usable timber for hoardings, battening, shuttering etc. for possible use on site with the balance being retained by the Contractor.
Mixed waste	The amount recycled will depend on the material	An absolute minimum will remain for transport to landfill.
Asbestos	100% landfill	Taken to a licensed site.