Proof of Evidence of The Leeds Railway Station (Southern Entrance) Order

(LSSE/PTE/P/3.1)

Proof of Evidence Construction
November 2012
Carillion Rail
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1 Introduction

1.1 Qualifications and Experience

1.1.1 My name is Matthew Murr. I have a Bachelor of Engineering Degree in Civil and Environmental Engineering from the University of Newcastle upon Tyne. I am a Senior Project Manager with Carillion Rail and have 18 years' experience gained in Civil Engineering Contracting.

1.1.2 My experience includes the supervision, management, planning and organisation of civil engineering schemes in the rail, water, highways and building sectors. I have been involved in a number of significant projects in this field, working on projects from inception through to completion. I worked previously on the regeneration of Leeds Station, the Leeds 1st Project, and have been involved in the LSSE Project since 2011, further developing my knowledge of the area and producing a robust plan for the construction of the proposed entrance.

1.2 Scope of Evidence

1.2.1 My report covers the following set of information:

a. Construction Assessment Process

b. Review of Construction Methodology

c. Access - Site Specific Issues

d. Land Requirements.

e. Conclusions

1.2.2 In addition I shall address Objections to the Order relating to the construction of the Leeds Station Southern Entrance.

1.3 Response to Statement of Matters

1.3.1 In this Proof of Evidence I will deal with the following issues under Item 5 in the Secretary of State's Statement of Matters, as follows:

a. The likely impact on residents, businesses and the environment of the scheme during construction.

b. Noise, dust and vibration, including the impacts of construction traffic.

c. The need for and proposed location of the construction compound.

In addition I shall address objections to the Order relating to construction issues.

1.4 Glossary

1.4.1 This Proof of Evidence uses the abbreviations as contained in the overall Glossary (LSSE.PTE/P/8.1)

2 Construction Process

2.1 Introduction

2.1.1 The LSSE scheme is the expansion of Leeds Railway Station to create an entrance on the south side of the existing station. This entrance will provide a shorter and more convenient route for foot passengers who live/work on the south side of Leeds Station and in particular the residents and business people who reside in the new development at Granary Wharf and Holbeck Urban Village. It will also alleviate the serious peak hour congestion which exists at station currently.

2.1.2 The new entrance was conceived as a visually iconic enclosed building which fits in with the contemporary buildings recently constructed in this area and will comprise of a concourse deck over the River Aire. Open link span bridges will provide direct stepped access from this concourse to the east and west banks of the river. The concourse will also extend back through the span of the station viaduct to link with a further bridge running parallel to Dark Neville Street and this access point provides step free access.

2.1.3 From the concourse, access to the station footbridge will be provided by steps, escalators and a lift. At the station footbridge level the widened bridge will provide an upper concourse with customer information screens, a potential ticket office, ticket vending machines and automated ticket barriers.

2.1.4 The new development will enable increased points of access and will improve the passenger journey times for local residents/general public and business users by providing more direct access on to the platforms of Leeds railway station. It will alleviate existing passenger congestion as well as facilitate substantially improved accessibility from the south and benefit approximately 17,000 passengers on a daily basis as well as facilitate an increase the number of passengers forecast to use Leeds Station.

2.1.5 Alongside the improvements to rail passengers' journey times to/from the station the new southern entrance will:-

1. Provide a 'step-free' DDA compliant entrance.
2. Meet existing and future demands.
3. Improve access/egress and evacuation options for the station.

2.1.6 In addition, the new entrance will complement the development of the south side of Leeds and in particular the Granary Wharf development.

2.1.7 The structure itself is made up of the following key components:-

a. Steel cased, bored end bearing piles
b. "GRP Bath Tub" formed Pile Caps in-filled with reinforced concrete
c. Structural Steelwork in-filled with in-situ RC slabs to form the River & Arch Decks
d. Structural steelwork forming the frame of the entrance building
e. Structural steelwork in-filled with in-situ reinforced concrete (RC) slabs to form the river side spans
f. Structural steelwork in-filled with in-situ RC slabs to form the stair/escalator landings and the western footbridge extension
g. Reinforced concrete lift shaft construction
h. Pre-cast staircase/escalator and lift installation
i. Proprietary sandwich cladding system and toughened laminated glazing to cloak the steel frame
j. Mechanical and electrical (M&E) Installation and Internal fit Out
k. The removal of existing pedestrian footbridge on Dark Neville Street

l. Construction of a new steel footbridge on Dark Neville Street constructed on the existing piers that will be raised to suit the new deck level
m. Construction work is planned to commence at the end of 2013 and the anticipated construction period is 14 months resulting in completion of the scheme at the beginning of 2015.

2.2 Constraints of the Site

2.2.1 LSSE is to be built above the River Aire navigation at what is presently the rear of Leeds Station on the south side of the existing station building. Current access to this area is particularly limited and the large apartment blocks, hotel & leisure facilities and office buildings in the area all add to the constraints of the site. The area is also a very busy pedestrian thoroughfare for residents/office workers and visitors who live and work in the Granary Wharf development. The attached Site Access Plan drawing ref: MAFA/102506/CS/010 highlights the proposed access routes.

2.2.2 Access to the work site for the transportation/delivery of materials and plant will either be via narrow/restricted/minor roads or along the River Aire. The close proximity and height of the adjacent buildings to the east and west sides of the work area seriously impact upon the ability to locate a tower crane in a suitably close position to the works and as such alternative methods of lifting have had to be considered. Details of how we will manage these restrictions are included in our access strategy, which is described below.

2.3 Access Strategy

2.3.1 When assessing the constructability of this particular scheme with its severe constraints with regards to the limited working space, working above water, the close proximity of large (15 storey) buildings and the limited road access, a detailed access strategy has needed to be devised to manage the following:-

a. The provision of secure welfare and office facilities in close proximity to the work area
b. The safe passage of the workforce/contractors/staff and visitors to/from the work site
c. The delivery of materials and plant to the work area
d. The provision of secure storage areas for materials and plant (some of which need to be close to the work site)
e. The lifting and movement of materials and plant around the work area
f. Safe access for the workforce in and around the work site (scaffolding and temporary platforms and crash decks)
g. The safe passage of the general public around the work site (segregated walkways)
h. The weight restriction on Canal Wharf Bridge which may restrict road deliveries to the west bank of the Aire

2.3.2 Three independent sites have been identified as being fundamental to the construction of the Scheme and these will be described in the strategy below with the delivery routes to each, identified on drawing MAFA/102506/CS/012 contained within the Constructability Report (LSSE.A18):-

a. The main work area to construct the new works.
b. Main compound area adjacent to the railway and at the end of Wharf Approach
c. The launch site on the east bank of the River Aire at the end of Water Lane

2.3.3 Vehicular access to these sites is described in section 2.6 below with the primary access routes being highlighted on drawing MAFA/102506/CS/012 contained within the Constructability Report.

2.3.4 Access to the west side of the works for the proposed main office and welfare set-up and for assembling the self-erecting IGO50 crane, will be via Wharf Approach and the stone arch bridge over the canal. This bridge is Grade 2 listed and as such, limits on deliveries and vehicle movements will need to be imposed. However it is envisaged that limited vehicular access will be required to this side of the works. (The primary vehicular access which will be required will be for the self-erecting IGO50 crane). A structural assessment on the strength and integrity of the bridge will be completed to establish the maximum load which can be transported over the structure although we are aware that vehicles of similar size used the bridge during the construction of the Isis development.

2.4 Welfare & Office Facilities

2.4.1 Given the value of the scheme and its complexity, a reasonably sized office and welfare facilities will be required to accommodate the staff, workforce and Sub Contractors which will be employed on the Project. Parking facilities for staff will need to be negotiated with local providers.

2.4.2 The very tight constraints of the site dictate that the large office/welfare setup that will be required cannot be physically located adjacent to the work site. Therefore it is intended to have a Main Office and Welfare Facility located to the west of the work area and have a ‘satellite set-up’ comprising of an office/toilet and welfare facilities adjacent to the work area at the end of Little Neville St (if a tower crane isn’t used in this location).

2.4.3 The Main Office & Welfare Facility to the west of the site will be set up on land adjacent to the railway as shown on the appended drawing MAFA/102506/CS/010. There is limited space for locating the required facilities within this area due to the emergency assembly point for platform 17 which is located here and the substation buildings which are also present on this land. However a small and compact set-up can still be configured. This land is at a level approx. 5m above Wharf Lane and the Granary Wharf development. (See photo above)

2.4.4 Therefore the following factors will have to be managed when setting up and using this facility:-

a. Delivering and lifting the cabins into place (there is limited space for a crane to be rigged up and for delivery wagons to manoeuvre themselves into the required position)
b. A reasonable size of crane will be required to position the cabins.

c. In the placement of the office / welfare cabins all existing cable troughs must be avoided to permit maintenance where necessary.
d. Staff and visitor car parking arrangements (no vehicular access is possible to this compound area) will be negotiated with local parking facilities. I.e. within the station undercroft.
e. Generally, vehicular access to the car parking facilities within the station undercroft will be maintained at all times. Some local traffic management and restrictions to access may be required during the compound establishment
f. The management of deliveries (office supplies/cleaning products etc.) to the facilities
g. Access steps will be required to provide pedestrian access for staff/operatives and visitors from the compound to the work area
h. Connection of mains supplies to the facility and drainage from the units
i. Gaining the necessary consents from Network Rail for establishing this compound facility in close proximity to the railway. The area is used as an emergency evacuation point from Platform 17 and the necessary area and routes must be maintained and agreed with the station management team.
j. Security of the compound area and securing the access steps as these provide potential access for unauthorised personnel onto the railway

2.4.5 As described above, the 'Satellite Set-Up' at the end of Little Neville St will provide critical facilities close to the work site, these will include an office for the Site Engineers & Foreman, toilet and washing facilities and First Aid equipment. Due to the limited space that is available (see photo opposite) in this area, the units will have to be double stacked and the following factors will have to be managed when setting up and using this facility:-

a. Delivering and lifting the units into place given the narrow width of Little Neville St and the close proximity of the buildings
b. Connection of mains supplies to the facility and drainage from the units
c. IT connection to the office for engineers to access drawings/email etc.
d. Security of the units
e. Obstruction of access into/out of the Blue Apartments

2.4.6 Other temporary small toilet and washing facilities may also be provided within the work area as the scheme progresses but the specific location of these will be dependent upon the stage of the works and the construction activities that are on-going. Basic welfare facilities will also be provided at Water Lane, the launch site for vessels and materials onto the river.

2.4.7 Due to the very limited space which is available in the vicinity of the work area, we will continue to investigate alternative options for the office facilities. These may include renting office space within local commercial units or developing some of the arches within Dark Neville Street. There are a substantial number of options available in this regard, and their identification at this stage is not considered to be critical.

2.5 Safe Passage of Workforce to the Work Area

2.5.1 As described in section 2.4, the main office and welfare facilities are planned to be

located approximately 200m from the work site and access between the two areas will be via a busy pedestrian thoroughfare in the Granary Wharf development. It isn't envisaged that a designated segregated walkway will be created through this area but all personnel will be reminded that they must conduct themselves in an appropriate and courteous manner when interacting with the public. The attached Site Access Plan drawing ref: MAFA/102506/CS/010 highlights the proposed routes between locations.

2.5.2 Once at the work site, access through the secure perimeter hoarding will be controlled by a turnstile/swipe card entry system which will be located on Dark Neville St and will then be via the arch deck.

2.5.3 Access to the work site during the early stages of the works (i.e during piling and the pier construction – pre arch deck construction) will be via a small safety boat and then from the pontoons and temporary platforms. It will also be possible to launch a small temporary access bridge or gang plank from the east bank to either the pontoon or the east pier during this stage.

2.5.4 As the construction work progresses temporary platforms and scaffolding will be provided for the workforce to access their work area.

2.5.5 The perimeter hoarding will extend around the 'satellite set-up' on Little Neville St and as such the workforce and staff will be able to access this area from within the work site by exiting the first arch to the east of the river through the existing door (see photo below).

2.6 Delivery of Materials & Plant

2.6.1 River Access

2.6.1.1 Access via the River Aire will be achieved from downstream (south side) due to the railway viaduct which supports the station building being upstream of our works. The river flows through the arches of the viaduct and provides minimal headroom and a large spillway which prevent any form of vessel from navigating through this section of the river. To the south side of the structure the river is flanked by large apartment blocks and is crossed by a footbridge and road bridge (Neville St), both of which restrict the height of any vessel passing under them to 4m. The Leeds and Liverpool Canal intersects the river approx. 100m south of the structure. See the attached Site Access Plan drawing ref: MAFA/102506/CS/010 which highlights the locations discussed.

2.6.1.2 A study of the river and its banks has identified an area of land on the east bank of the river on Water Lane (see photos opposite) to be the most appropriate point, that is in close proximity to the works (and is the shortest journey time and distance for transporting materials) for launching vessels into the river and loading them with materials/plant. This site is to the west of Leeds Bridge which is a low cast iron arched structure under which vessels laden with large plant (cranes/piling rigs) may not pass. The area of land on Water Lane also offers:-

a. Reasonable access for large delivery vehicles via Water Lane
b. Sufficient room for the turning of large plant
c. Sufficient space for the temporary storage of materials on land and plant
d. Clear access on the water edge, although the level difference between ground and water level will require the construction of temporary access stairs and platforms.

2.6.1.3 The removal and repositioning of the stone arch and low level wall/footings at Water Lane will significantly improve the use of the space available. This will enable the large crane to be positioned in the most advantageous location adjacent to the river; and it will permit the delivery wagons to manoeuvre around the location in a safe manner. An additional concern in working around the arch is its unstable and unsupported state. This creates a potential safety issue to workers or plant respectively working in the area as there is potential for the structure to collapse or fall over if contact is made during lifting operations.

2.6.1.4 Provisions will also need to be made to:

a. Secure this area
b. Restrict parking on Water Lane to permit clear access for delivery wagons

2.6.1.5 Level and stabilise the ground using imported fill to make it suitable for receiving and lifting heavy plant

2.6.1.6 A public footpath runs through the area along the river bank and the temporary closure / diversion of this will be required.

2.6.1.7 Large vessels/barges which will be used in the construction process will be sailed up the river from downstream (the location will be dependent upon which contractor/supplier is used).

2.6.1.8 Once launched onto the river the pontoons/barges/boats will either be:-

a. Moored on the bankside at the designated mooring points for the crane to lift the materials/plant to the work area.
b. Affixed into position in the river and adjacent to the work area by placing ropes around the existing viaduct piers with lateral restraints being attached to fixings on the riverbank walls on either side.

2.6.1.9 With the river not being navigable through the viaduct section we do not envisage there being a problem with these vessels/barges/boats creating an obstruction to other vessels. However, the implications of having large amounts of vessels in the river will require managing / consideration with regards to:

a. High water levels/flood conditions.
b. Environmental and ecological impacts (increased risk of pollution fuel spills) and impact on fish and wildlife. These elements will be managed in accordance with the Pollution Prevention Guidelines issued by the EA. outlined in the Environmental Statement (LSSE.A15).

2.6.2 **Highway Access**

2.6.2.1 The only significant road link to the area is Neville Street, which is a very congested route into Leeds City Centre, and runs at least 80m from the work site. Vehicles will be able to gain closer access to the work site via Little Neville St (see opposite). This is a 6m wide carriageway which runs between the Blue Apartments and the Hilton Hotel and as such is not a direct link to the work area.

2.6.2.2 The alternative is to use Dark Neville Street (see opposite) which is an 8m wide carriageway which runs below the railway viaduct and will provide access to the rear of the work area but has the following restrictions:

a. Limited space for turning
b. Limited headroom
c. A weight restriction of 3T on the bridge at the west end behind the work area
d. Restricted access off Neville Street

2.6.2.3 Vehicular access via Wharf Approach & over the cobbled area between the

railway viaduct and the Mint Hotel may also be possible but this has the following restrictions:

a. Limited to reasonably light loads given the cobbled construction
b. Limited room for turning
c. This area is a very busy pedestrian thoroughfare.
d. Vehicular access must be maintained to the station undercroft for parking and deliveries to reduce the impact on users and loss of revenue for businesses.
e. A thorough dilapidation survey will be completed in partnership with relevant 3rd parties to agree the existing condition of the cobbled access road leading to where the IGO50 crane is to be erected. If necessary, temporary membrane / mats will be used to prevent damage to the cobbles during the transportation of the crane.

2.6.2.4 With the limited nature of the road links and the probability that a tower crane will not be viable, it is envisaged that the delivery of materials and plant via road wagons to the actual work site will be limited to small vehicles that will use Dark Neville Street, with the primary means of delivery by barge. Any road delivery operations will have to be carefully controlled, given the restricted space for turning and lifting. Agreement will also be required for restricting / segregating public pedestrian access through the Dark Arches to remove the interface with moving delivery vehicles.

2.6.2.5 If the use of a tower crane does prove to be possible, the delivery of materials and plant using large wagons may be possible via Little Neville Street. However, parking restrictions and temporary closures will have to be agreed with Leeds City Council and some localised traffic management measures will have to be installed with banksman supervision required for assisting with the slewing/reversing vehicles.

2.6.2.6 Large deliveries via road will be made to the Water Lane site where they will be transferred onto barges/vessels in the river to be transported upstream to the work site. With the tight radius that the delivery wagons will have to slew around when turning from Meadow Lane into Water Lane and vice versa, localised traffic management measures will have to be installed:

a. Supervised by a banksman (reversing) and
b. Restricted when wagons exit Water Lane (no left turn)

2.6.2.7 Whilst highway access around the site is known to be difficult and the size and weight and potentially the frequency and timing of deliveries will need to be very carefully controlled, it is still envisaged that considerable numbers of delivery vehicles will be visiting the site. An assessment of the anticipated type and frequency of deliveries is listed below:-

	Work Area – Little Neville St & Dark Neville St	**Wharf Approach/Granary Wharf for access to office/compound and to assemble self-erecting crane**	**Water Lane – Launch point for vessels and materials onto the River Aire**
Type of Deliveries and size of vehicles	Small pick ups delivering small tools and plant to the stores under the Dark Arches. Small wagons delivering consumable materials to the facilities and site. Concrete wagons. One off large delivery wagons transporting the escalators are likely to use this route towards the end of the programme	Small wagons delivering consumable materials to the office & welfare facilities will use this route as well as staff and visitors who may park their cars in the station undercroft (note- other car parking sites in the vicinity could also be	Large delivery wagons (sometimes articulated) delivering the large components of the structure (steelwork, pre-cast concrete, cladding, glazing) and the barges/vessels to transport the large materials up the river

		negotiated/utilized). Otherwise the only other vehicles using this route will be the IGO 50 self-erecting crane to gain access to the west bank and the crane and delivery wagons for establishing and dismantling the office and welfare facilities	
Time of Deliveries in Contract Programme	Plant and consumable material deliveries will be throughout the duration of the project. Concrete deliveries will be at their peak/concentrated at the start of the programme during piling and foundation works and will be intermittent thereafter	The delivery of consumable materials to the office/welfare facilities will be throughout the duration of the contract and the larger deliveries of the cabins and cranes will be limited to the start and finish of the contract	The delivery of large components for the structure will be on going throughout the contract programme but this will be carefully managed so that deliveries arrive when required to limit the amount of storage/double handling and craneage
Frequency of Deliveries	It is estimated that a peak level of 20No small delivery wagons could arrive per day, dropping off/collecting plant and small materials as well as delivering concrete	It is estimated that on average 3 or 4No small delivery wagons a day may use this route and during the erection/dismantling of the cabins a maximum of 5No wagons may visit site on a single day	It is anticipated that large deliveries will not arrive every day (as described above they will be carefully managed so that deliveries arrive when required to limit the amount of storage/double handling and craneage) and as such on days when deliveries are scheduled 5 or 6 large vehicles may arrive per day
Effect of using a Tower Crane on the East Side of the River Aire	A similar number of delivery vehicles will visit site via Dark Neville St if a tower crane is used however there will be a significant increase in the number of large delivery wagons arriving on site via Little Neville St as the tower crane will be able to lift some large components (steelwork, cladding, precast concrete, glazing) directly from wagons parked on Little Neville St. However the limited space available on Little Neville St will result in the number of large articulated vehicles arriving on a daily basis being restricted to a maximum of 5/day as there is insufficient space for more than one wagon to arrive at one time. Barges on the river will still have to be used for temporarily storing materials	The use of a tower crane will simply eliminate the need for the IGO50 to be used on the west bank and as such the only vehicle movements via this route will be small wagons delivering consumable materials to the office & welfare facilities as well as staff and visitors who may park their cars in the station undercroft	If a tower crane is to be used the amount of large deliveries arriving at Water Lane will be reduced, however this area will still be used as a launch point for getting barges and vessels onto the river and some large materials will still be lifted onto the barges at this location because of the very restricted space available on Little Neville St. Therefore it is estimated that 3 or 4 deliveries would be scheduled per day (when lifting was planned or the number of days per week would be reduced)

2.6.3 Railway Access

2.6.3.1 As the construction work progresses up to platform level within Leeds Station it will be of benefit to the scheme if access can be secured from platform 17 into the work area. In particular for the delivery of Mobile access platforms (MEWPS) and small plant. To undertake this operation an access point which will be as small as possible will be broken through the external wall of the station building; and the necessary liaison with the Station Manager and interaction with the railway and passengers on platform 17 will have to be managed to undertake this operation. Upon construction of the access point, the security of this temporary access route will be of utmost importance with secure gates being installed.

2.6.3.2 Further use of the railway may be possible for the delivery of materials to the work area. However, at this stage we believe this is an unlikely option because the off loading methods will be very difficult given the overhead line equipment and the roof of the station preventing the use of the tower crane. In addition, the

co-ordination of deliveries in conjunction with disruptive possessions with the regular train movements may prove difficult to organize.

2.7 Material & Plant Storage

2.7.1 As described in the section above, materials will be stored on barges moored on the banks of the river. This will permit the crane to then lift them to the work area. The barges will be used to store the large and bulky materials including steel work, GRP permanent formwork, cladding and glazing. When using the barges to store materials the following factors will have to be considered:

a. Safe access onto the barges for the slinging of the materials to be lifted
b. Security to prevent unauthorised access onto the barges and to prevent the theft of the vessel and materials
c. Methods for manoeuvring the barges when emptied

2.7.2 Prior to loading the materials onto barges at Water Lane, there is additional space available for storing surplus materials at this site however, the co-ordination of deliveries and loading directly onto barges will be carefully managed to limit the amount of double handling. Secure perimeter fencing/hoarding will be erected to prevent the theft of any stored materials.

2.7.3 A storage facility will also be provided within two of the viaduct arches on Dark Neville St, within these arches small materials and small plant will be stored in secure stores. These arches will be contained within our perimeter hoarding to prevent unauthorised access. Other factors to be considered when managing the use of these storage areas are:

a. Access to the stores for deliveries
b. Temporary lighting to the area
c. Agreement for the use of the arches (currently used for car parking)
d. Delivery of the stores into the arches – limited headroom. If not possible alternative arrangements to be made for securing the plant and materials

2.8 Lifting & Movement of Materials around Site

2.8.1 The previous two sections have described how materials and plant will be transported to the site and the facilities which will be required to store them. In this section a general overview will be provided of the methods that will be used for positioning the materials in place in the construction process. Although this will be described in more detail in the Constructability Report (ref LSSE.A18) submitted in the TWAO application.

2.8.2 A number of options have been considered in the selection of appropriate plant and equipment to handle and place materials around the site which has centred on the use and location of a tower crane. On consideration and discussions with specialist suppliers there are two possible locations for a crane to be positioned on either the west or east bank.

a. The suggested location for a crane on the east bank to the rear of the blue apartments will satisfy the lifting requirements for the scheme and the footprint available is adequate to accommodate a significant tower crane. In order to select the appropriate crane we have undertaken a study of specifications, duty charts and engaged in discussion with suppliers to provide a crane of suitable capacity. The outcome of these studies and discussions are detailed

in the Constructability Report. However, the erection of a tower crane of this size will prove to be difficult within the confines of the area identified.

b. The alternative identified is to utilize a self-erecting IGO50 crane located on the west bank which will satisfy the lifting requirements of the scheme whilst avoiding the problems with erection and of assembly.

2.8.3 On consideration, the bulk of the lifting will be done using this self-erecting tower crane positioned on the west bank of the river (see crane strategy section 4.9 of the Constructability Report). Detailed assessments on the lifting capacity of this crane and the working radii will have to be done in conjunction with the design of the project so that the correct maximum size of components can be determined. Along with the careful design of the size of components the positioning of the barges/pontoons will also have to be carefully managed so that the crane can definitely reach the vessel and then safely lift the components off.

2.8.4 Once lifted from the barges, materials will either be fitted directly into place or may then be deposited onto the temporary working platforms within the work site to then be manually fitted or lifted using a smaller lifting device (e.g. glazing robot pictured opposite).

2.8.5 For this reason all temporary platforms (and the first floor slabs and stair landings in the permanent works) will be carefully designed to ensure that they are able to support the stock piled materials (the storage of waste materials also has to be considered) and any small secondary lifting devices/plant/MEWPs that may be used within the structure. It is essential that temporary fixing points/support steelwork and brackets etc. are cast into the permanent works for the construction of the temporary platforms.

2.8.6 The construction sequence will also have to be carefully managed so that temporary works and plant used within the structure can be safely removed once they have been utilised (i.e. they are not trapped inside).

2.9 Safe Access for the Workforce in and Around the Work Site (scaffolding and temporary platforms and crash decks)

2.9.1 Due to all of the work being carried out above the water, large temporary decks and scaffold systems will need to be erected for the workforce to carry out their work from. These will need to be designed to take the loads of the workforce, their tools and equipment/stock piled materials and lifting equipment and plant. The temporary decks and scaffold will also need to provide good unrestricted working space to the operatives; and they will need to be carefully designed to be set up at the correct levels or need to be adjustable to achieve the desired level with due cognisance given to the restrictions they may place on lifting operations. Very experienced and competent scaffolding contractors will be engaged to design,

construct and alter the scaffolding systems used.

2.9.2 Temporary bridge structures or gang planks will be erected to provide safe access across from the river bank to the work area and temporary stairs will be provided where possible (not ladders) for accessing the various levels of the new structure.

2.9.3 All scaffolding/edge protection will have debris netting/screens or brick guards affixed to prevent any materials from falling and to contain any dust from spreading to the adjacent residential properties. Acoustic barriers may also be erected to suppress the noise from loud construction activities. Obviously the design of the temporary platforms and scaffolding will have to take account of the additional loading that these barriers/screens may impose.

2.9.4 Beneath the high level steel work and roof work safety nets will be provided and when working on the footbridge extension within the station, falsework may need to be erected above the railway to support the trusses of the new structure. This will be dependent upon what possessions and blockades can be agreed with Network Rail and the Station Manager. Similarly the permanent formwork will need to be constructed within the footbridge before the roofing work is undertaken to prevent materials from falling onto the passengers and railway below.

2.9.5 A more detailed analysis of the impact of the new construction work on the railway and the station and its trains and passengers is captured in Section 4 (Construction Sequence & Methodology) and Section 6 (Possession & Logistics) of the Constructability Report (LSSE.A18).

2.10 The Safe Passage of the General Public Around the Work Site

2.10.1 As referenced previously the Granary Wharf area is a very busy public space with high levels of residents, business people and tourists using the existing pedestrian routes which link Dark Neville St to the river area and the offices/hotels and apartments in Granary Wharf and beyond. For this reason our work site will be surrounded by solid hoarding to prevent unauthorised access. The exact alignment and layout of the hoarding will have to be agreed locally with commercial units such as the Golf Bar to provide the most aesthetically pleasing but safe solution – incorporation of vision panels into the hoarding will be an option. Clear signage will be affixed to the hoarding to direct the public around the work area and to describe the scheme and to highlight the hazards and risks that are associated with the project.

2.10.2 In addition to the provision of information panels and project notice boards for the display of relevant project information within prominent areas in and around the station it is also proposed that regular public liaison is established in the form of meetings and forums to involve the surrounding community in the works. This has been successfully implemented on other schemes to provide a channel of communication and allows the project to react to the needs of adjacent stakeholders. It is the intention of the project to appoint an individual to undertake the role of public liaison to act as a single point of contact and to coordinate these forums. The public liaison group will provide an opportunity to communicate the developments on the project with an aim to inform and provide two-way dialogue.

2.10.3 Some existing footpaths and walkways will have to be temporarily closed or have access restricted along them as shown on the attached Site Access Plan MAFA/102506/CS/010. These closures/restricted accesses will have been incorporated within the TWAO. When a closure is in place, clear signage and information boards will be erected providing clear direction for the diversion.

Temporary pedestrian barrier may also be erected to create an obvious walkway and if uneven ground conditions are encountered temporary membranes can be rolled out to give a desirable walking surface

2.10.4 Similar measures to the ones described above will be employed at Water Lane where secure fencing or hoarding will be erected around the perimeter of the site and a temporary footpath diversion will have to be established with temporary pedestrian barrier if necessary.

2.11 Consideration of Alternative Construction Methods

2.11.1 The brief for compilation of the constructability assessment was to formulate working methods to allow the safe construction of the proposed southern entrance. In order to finalise this methodology a number of alternative solutions were identified and considered. The chosen methodology represents our assessment of the most efficient method of delivery which prioritises the safety of the general public and the workforce whilst taking due cognisance of the operating regime of the station and the needs of local businesses and residents. The chosen method seeks to minimise the impact of the construction works and the selected sequence has been developed to deliver in the most efficient manner possible.

2.11.2 There are a number of alternative construction methods and these are detailed in the Constructability Assessment which was submitted as supporting documentation in the TWAO application.

3 Site Specific Issues

3.1 Introduction

3.1.1 The construction process as described in this proof of evidence is intended as an overview which addresses the stages of construction and the various elements which must be accommodated for the project to be constructed safely and efficiently. This section of the proof is intended to address specific issues which have been raised that have directly affected the choice of working method and mitigation measures which may be required to address them.

3.2 Operational Railway

3.2.1 The proposed station entrance is located adjacent to Platform 16/17 and the extension of the footbridge also spans over Platform 15. The construction sequence of the new entrance and footbridge has been planned to minimise the impact on the operational railway and to provide a safe working method.

3.2.2 All works which are over or within 3m of the railway have been considered as ‘on or near the line’ and will require a safe system of work to construct. Any works which are likely to affect the operational railway will have to be undertaken during ‘possession’ in order to provide a period where no train movements are required and the overhead power supply can be isolated to ensure safe working.

3.2.3 Having investigated the opportunities available to provide these train-free periods the programme has been developed to make use of these periods and allow these ‘possessions’ to be booked well in advance. Wherever possible the extent of these activities has been limited through the use of hoardings and protective scaffolding to provide a physical barrier between the operational railway and negate the requirement for possessions.

3.2.4 Activities which require a possession/isolation include:

a. Crane lifting over the line
b. Works on the platform
c. Erection of a scaffold platform and deck above the line.

3.2.5 Due to volume of rail traffic through Leeds Station and timetable requirements these opportunities are usually overnight and there will be a requirement to undertake night working on the limited activities listed above. These works will be controlled by a robust safe system of work which will include mitigation measures to limit noise and intrusive lighting.

3.3 Navigation

3.3.1 The location of the permanent structure falls outside the navigable section of the River Aire but activities during the construction process will impact upon the navigable section of the river up to and around the entrance to the Leeds-Liverpool canal. These activities include

a. Loading of barges at Water Lane
b. Transport of materials on barges
c. Mooring of stored materials at the worksite.

3.3.2 The loading area has been selected to ensure that adequate space is available to safely moor the barges allowing river traffic to be unaffected.

3.3.3 The movement of barges to and from the worksite should be undertaken with due regard to the movement of leisure craft on the river. This navigable section is particularly busy during the summer months at the Leeds - Liverpool canal lock and a procedure for the transport will be included in the safe system of work. This will be agreed with the River and Canal Trust with whom there will be continued close contact.

3.3.4 The area for the storage of barges has been selected to avoid the navigable section and the number of barges will be limited to avoid congestion on the river.

3.4 Impact on the Highway

3.4.1 The scheme is unlikely to have a detrimental effect on highways in the area as traffic management schemes have been developed to ensure that adequate provision is made to inform drivers and accommodate pedestrians.

3.4.2 If the tower crane option is selected then a greater volume of deliveries will utilise Little Neville Street. Provision must be made to allow existing access routes to remain. The route will only be closed during the erection of the crane and it is likely that this will be undertaken over a weekend.

3.5 Use of Cranes

3.5.1 The construction assessment considered the use of both a tower crane located behind the Blue Apartments and a folding tower crane located on the west bank. The TWAO submission has included both options to allow flexibility in the construction delivery.

3.5.2 The viability of the fixed tower crane option has yet to be proven but this has been considered in the Constructability Report and would provide the optimum solution for off-loading and placing of materials. The issue with the tower crane is the space required to construct the jib and load into place on Little Neville Street as a

large mobile crane is required. Given the constraints on Little Neville Street it is acknowledged that there is very little space for this activity to be undertaken safely.

3.5.3 The report has concluded that the folding crane can be used to deliver the works albeit that this option cannot make use of road deliveries on Little Neville Street and will require more deliveries by barge.

3.5.4 The use of the folding crane and the tower crane has different impacts upon the adjacent properties and these are considered below.

3.5.5 Tower Crane – In order to operate a tower crane located to the north of the Blue Apartments use of the jib will be required over the Blue Apartments, The Hilton Hotel and Little Neville Street. It is possible to ensure that loads are lifted from delivery vehicles on Little Neville Street and are not directly transported over the buildings; however over-sailing of the jib will be required. The tower crane can be restricted to avoid the suspension of loads above the properties. A safe system of work and agreed exclusions zones will be implemented to ensure that risks associated with this operation are eliminated.

3.5.6 Folding Crane – Over-sailing of adjacent properties will not be required for the folding crane option however access will be required via the Isis development for the initial delivery of the crane and for servicing and routine maintenance. Deliveries for this option will be undertaken via barge which will be loaded at the launching are identified on Water Lane.

3.6 Noise and Vibration

3.6.1 During the construction activities there will be noise and vibration generated which should be kept to a minimum to avoid nuisance to adjacent properties and third parties. An Environmental Management Plan will be prepared as part of the standard documents under which a Noise and Vibration section will specify methods of working, hours of work and noise controls to be applied. A safe system of works to be employed on each activity will ensure that levels are maintained within the required limits

3.6.2 The construction methodology has considered the generation of noise and vibration in the selection of working methods and the application of control measures. The piling rig selection will be key to ensuring that acceptable levels of noise and vibration are adhered to. Careful selection following an assessment of ground conditions has resulted in the specification for rotary piling with steel casings. This avoids the noise and vibration generated from percussive methods and reduces the impact on the watercourse with the introduction of a steel casing.

3.6.3 Other noise mitigation measures are outlined in the Network Rail Environmental guidance notes and include but are not limited to;

a. As a matter of course, low noise plant and equipment should be used which conform to current standards. All plant and equipment used by the contractor and any subcontractors should be sourced from the company's nominated supplier, which in turn will be approved by Network Rail. These suppliers should be familiar with and adhere to the regulations associated with noise emissions from equipment. Site procedures for the acceptance and checking of equipment prior to use should also be in place.
b. Plant and equipment should be examined on a daily basis and defective plant should be removed from use.
c. There should be measures to ensure screening/enclosure of mobile and fixed plant as a simple means of containing noise at source.

d. Delivery vehicles should be coordinated to avoid queuing or excessive waiting and should be switched off when not in use.
e. Wherever possible all noisy works should be programmed to take place during normal working hours.

3.7 Light

3.7.1 Due to the close proximity of both the Blue Apartments and Waterman's Place consideration needs to be given to the potential light pollution or nuisance generated from site lighting during the construction phase. During the construction process lighting will be required to ensure a safe working environment for any night working, winter working and for works within the Dark Arches. Lighting requirements can be classified as two types:

3.7.2 General Access lighting – Lighting will be provided throughout the site for access and egress of the workforce. Lighting should be placed to ensure that it is not intrusive to neighbouring properties as far as is reasonable practicable and is turned off when not required.

3.7.3 Task Lighting – Task lighting will be provided for specific activities and is likely to be portable and temporary.

3.7.4 Efforts should be made to utilise the most appropriate level of lighting specific to the area or task been undertaken with consideration of its effect on adjacent properties. Mitigation measures to prevent light pollution or nuisance to adjacent properties include.

a. Consideration of the location of lighting relative to sensitive receptors.
b. Diffused lenses on access and task lighting to prevent excess glare.
c. Shrouding of lights to prevent unnecessary overspill.
d. Separate lighting circuits to isolate areas not required or been worked on.

3.7.5 It is proposed that lighting levels can be discussed at the regular public liaison forums and any issues of concern can be addressed by the contractor.

3.8 Dust

3.8.1 Throughout the construction phase the materials used and the processes required are likely to generate dust which must be effectively controlled. The adjacent properties at the Blue Apartments and Waterman's Place are in close proximity to the works and could suffer from nuisance created by dust unless specific control measures are in place.

3.8.2 The Environmental Management Plan for the scheme will include a section on dust outlining the control, measures to be implemented and any acceptable limits to be adhered to. The generation of dust throughout the works will need to be monitored and controlled through specific control measures incorporated into the agreed safe system of work.

3.8.3 Control measures are to include;

a. Regular sweeping of roads and access.
b. Damping down of any cutting operations.
c. Appropriate covering for stored materials.
d. Solid hoarding around the work area.

3.8.4 Given the appropriate implementation of control measures any potential nuisance from dust can be managed. The project must also ensure that areas surrounding the immediate area are regularly cleaned to avoid accumulation of dust.

4 Conclusion

4.1.1 As Network Rail's Multi Asset Framework Advisor (MAFA) Contractor, Carillion Rail was engaged to undertake a constructability assessment of the Leeds Station Southern Entrance scheme [LSSE].

4.1.2 In assessing the different methodologies that we believe are possible we have based our evaluation on the information contained within the approved GRIP4 design. We have consulted with and engaged our Health, Safety and Environmental teams, our Engineering Services team and Specialist Sub Contractors and Suppliers to ensure where possible that current technical, Health and Safety and Environmental standards and legislation are considered.

4.1.3 The report produced contains details of different methodologies that have been explored with regards to the key construction elements of the scheme in which consideration has been given to the severe access constraints of the site; which include working over the River Aire navigation, working in very close proximity to large residential properties and to work in a manner that will minimise disruption to passengers and trains using Leeds Station. These constraints have been considered and the recommended methodology selected to ensure that the structure can be built in a safe and efficient manner. This report outlines the working areas required and the public domain areas affected by the scheme.

4.1.4 The chosen solution utilizes road and river access with craneage and access requirements identified which ensure the scheme can be constructed with due consideration given to the adjacent operations and the close proximity of the public. This solution involves the use of barges and a tower crane to facilitate delivery and placement of materials and outlines the requirements for workforce access, working platforms and protection of the public through hoarding plans and consideration of access routes.

4.1.5 A series of disruptive possessions are identified which allow the works over the operational railway to be constructed which will require further consultation with the appropriate bodies. This solution represents a balance between the requirements of the operational railway and the efficient construction of the new footbridge roof and access.

4.1.6 Further development can be undertaken through the design and implementation phases to refine this working methodology and introduce robust working procedures and practices however the chosen methodology represents my view of the most efficient method of construction for the proposed Southern Entrance.