NLSME SEAMING BAY REFURBISHMENT PROJECT

First issue 25th Oct 2024

Introduction

These notes aim to provide an outline design for each element of the proposed refurbishment of the raised track steaming bay area at Colney Heath. The details provided in these notes provide a level of detail to enable those taking on each element of the works with enough information to allow a full assessment of the scope of works and a plan for construction to be developed.

These notes are not intended to provide detailed drawings or describe how the project will be progressed etc but should enable each element to be taken forward and a realistic assessment of the likely costs to be calculated.

There are however a few decisions on which option should be adopted for certain elements of the project. Each of these are described in these notes

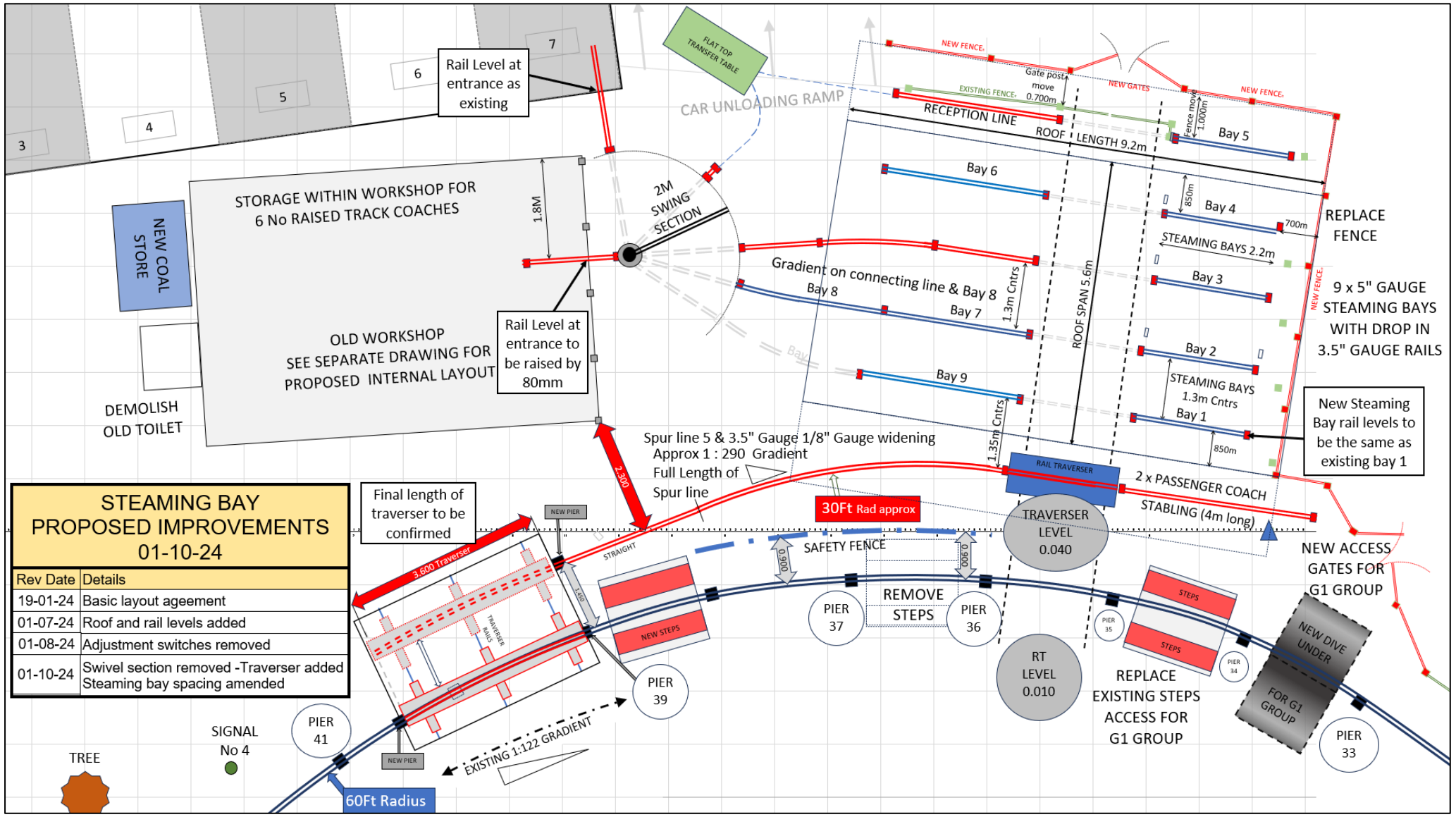
The steaming bay project can be divided into eight parts.

1. Refurbishment and repurposing of the existing workshop building
    a. Basic plan and description of the proposed changes
2. Replacement of concrete base of steaming bays and replacement of steaming bays.
    a. Replacement of concrete base
    b. Setting out information for new bays, roof foundations etc
3. Installation of new power supply to each steaming bay and water
    a. Basic description of electrical supply to be provided and ducting routes
    b. Suggested option for water supply. This is subject to further discussion
4. Installation of new steaming bay roof
    a. Basic design of structure and support column locations
5. New connection to raised track and spur line
    a. Swing out solution described
    b. Traverser option described utilising part-built traverser relocated (preferred option)
6. Signalling for new swing out or traverser section
7. Alterations to existing traverser at steaming bay
8. New access arrangements to G1 railway

The working group met in early October 2024 to review what is proposed and agreed the details outlined in this document. The group decided what elements of the works, if any should be considered for delivery by a paid contractor. The group also discussed the order in which the various element of the project will be staged and who will manage each element.

The plan below is the latest issue and reflects the discussions held with the working group.

Within this document there are additional details added to the plan. These notes will be updated as necessary as the project is developed.



Refurbishment of existing workshop building

It has been decided that the existing building will be repurposed. This will require limited alterations and some refurbishment of the building.

The proposed internal layout of the building is still subject to discussion, but the drawing below describes the current proposal.

Key elements of the work include –

Rewiring with new 240v power sockets & lighting.

New power supply 12 & 24v for steaming bays.

Internal walls to be installed.

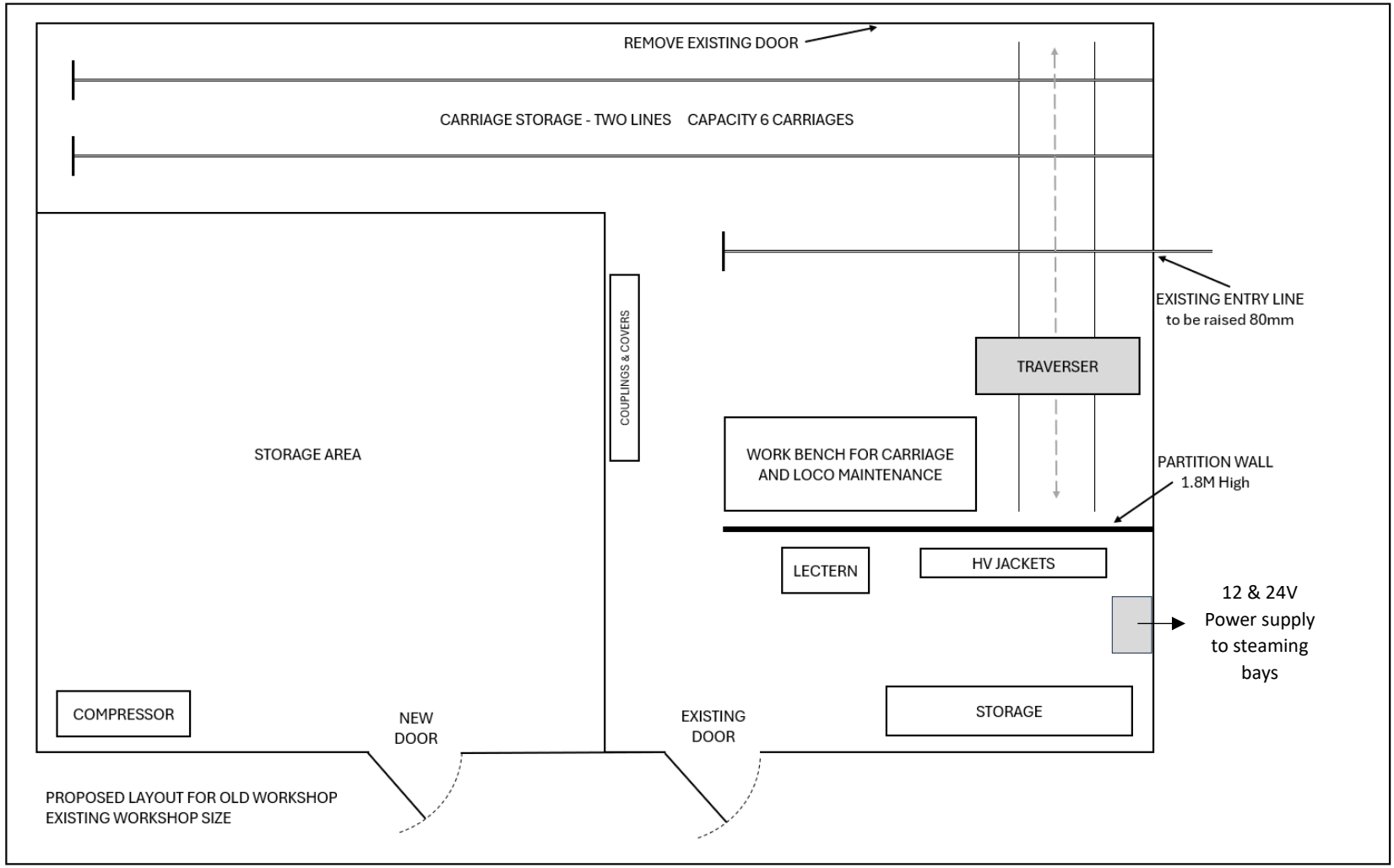
Storage for RT carriages including internal traverser

Relocation of access door and closing up door at back of workshop.

Raise entry line track to steaming bay to same level as track from container 7. (approximately 80mm lift)

Existing roof structure and cover to be retained. Insulation layer to be added to mitigate condensation issues.

Concrete floor to be levelled where necessary.



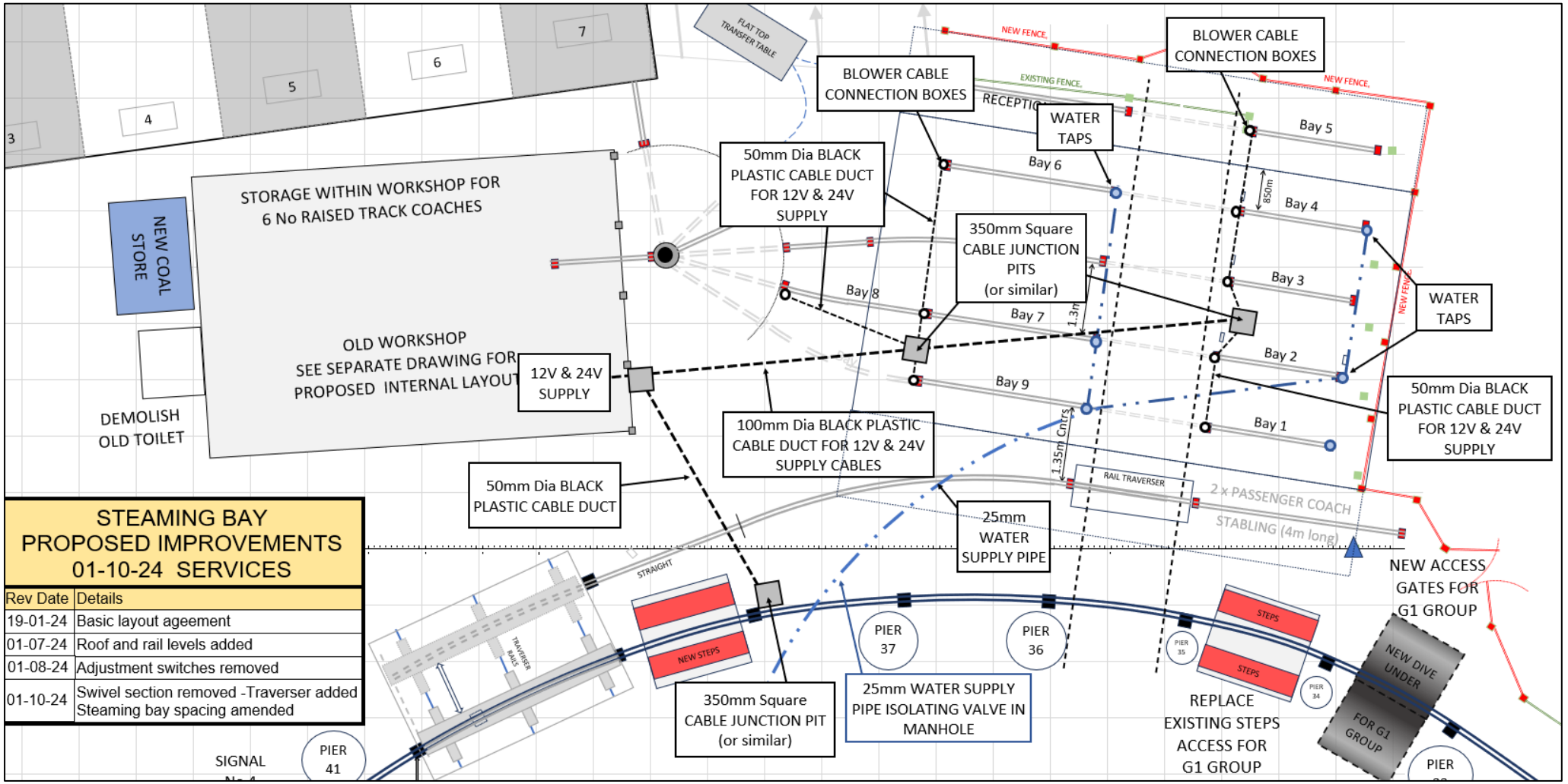
Roof rainfall drainage and gutter to be repaired as necessary.

Refurbishment of steaming bays

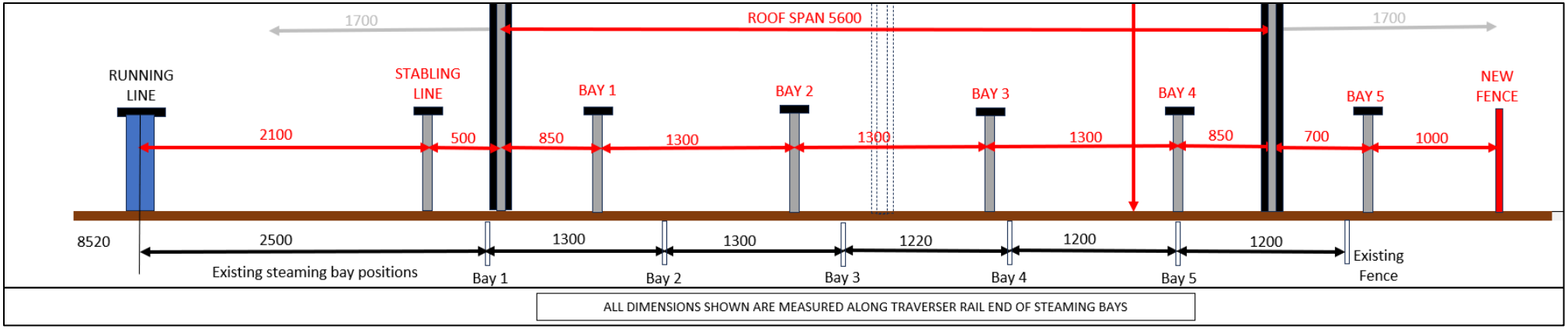
The existing concrete base is to be completely replaced together with all the steaming bays. New electric and water supplies will also be provided. The concreted area is extended as part of this proposal.

The drawings below provide basic setting out details for the steaming bays, roof supports and ducting for electric and water supplies.

Rail levels can be found at the back of this document.



The existing concrete base is to be completely replaced. The surface of new base will be laid to approximately the same level, but exact levels will be defined by the traverser rail levels which remain the same. Type of base proposed is concrete.



The new steaming bay positions can be set out using the RT running line centre line as datum with spacings measured along the alignment of the existing traverser rail adjacent to bays 1 - 5.

The new traverser rails should be placed on the same alignment and at the same level as the existing traverser rails.
It is essential that measurements from fixed points to the existing traverser rails and levels are noted before demolition.

This will allow reinstatement of traverser rails on the existing horizontal and vertical alignment. They need to be extended to provide connectivity with new bay 5 and the reception line. This issue requires further assessment as complete replacement of the existing rails will be required if they cannot be recovered in good condition.

The other fixed point is the rails connecting to the old workshop. This track is at the same horizontal position of the existing line into the workshop, but it will be raised by 80mm to bring it to the same level as the line into container 7.

New Steaming bays will be installed at the same rail levels as existing. Rail levels on the connecting line between new bays 6 & 7 will alter to match the 80mm rise in the rail levels on the connection to the workshop. Rail level of bay 8 will also need to be determined.

The existing traverser is retained but requires modification to allow it to move passenger carriages as well as maintaining its current use for moving locomotives from the steaming bays onto the raised track. These modifications are described in section 5 of these notes.

The layout of the base for the steaming bays will need to accommodate the supports for the proposed roof. This will require temporary filled voids in base which can be easily excavated at a later stage of the project to allow the roof supports to be installed.

The base shall have power supply ducting to each bay and water pipes. The cable junction pits could be brick built with cast iron non-slip covers. Other options are available.

The new steaming bays will have a 12V and 24V supply provided at each steaming bay. A good example of how this could be provided is shown in the picture. Ducts within the concrete can be plastic but the above ground sections will need to be a steel conduit.

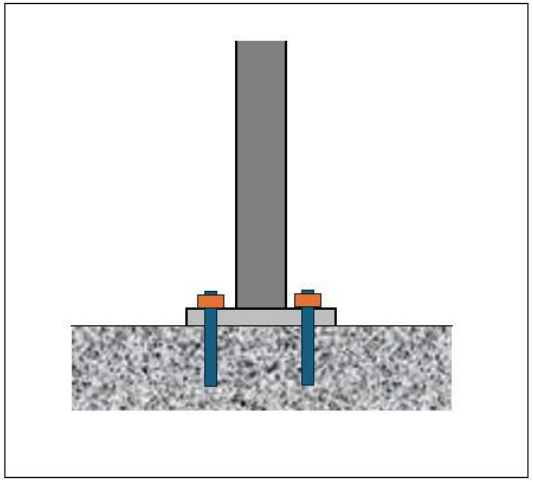
It is assumed at this stage that if lighting is to be provided under the new roof this will be routed via a gantry from the roof of the existing workshop to the steaming bay roof. If compressed air lines are to be provided these will follow the same high-level route. Neither of these elements have yet been defined.

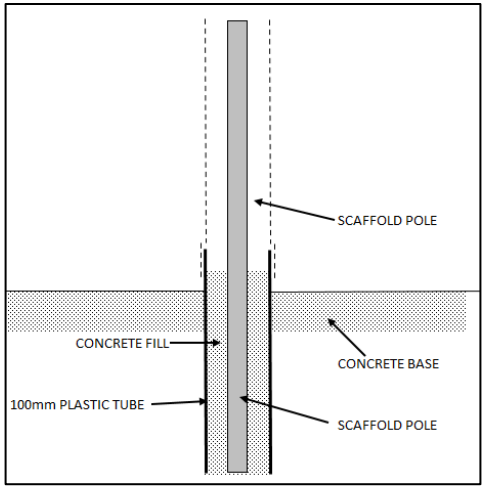
The swing section by the old workshop rail entrance will pivot at the workshop end and have a simple locking arrangement to connect to each track. It should also have a simple locking arrangement to allow locos to be transferred to & from the flat top transfer table.

The fence around the steaming bays will be repositioned. The design of the new fence has not yet been specified but it would be a good idea to relocate what currently exists and add new panels where required. A decision on type of fence needs to be agreed.

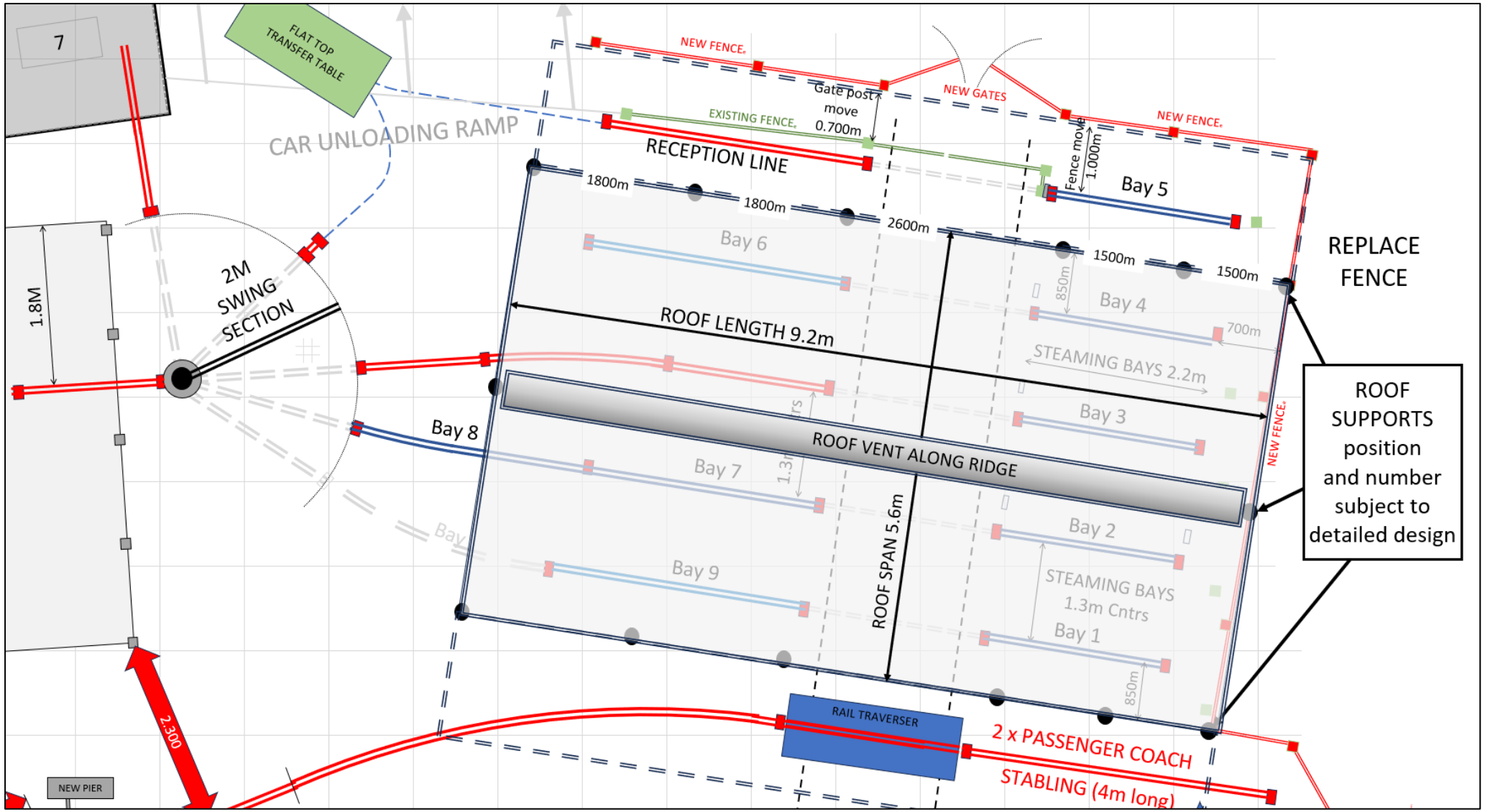
When casting the new concrete base provision will be required for the support columns for the new roof which will be installed at a later stage of the project.

This can be achieved by either leaving a void in the new base as shown or designing the new roof supports and steaming bay supports with plates welded to the base and bolted to the new concrete. This is currently the preferred option. The advantage being the final design for the roof supports can be detailed at a later stage.





Steaming bay new roof



Following discussion with members it was concluded that a roof over part of the new steaming bay area would be provided. However, any design should allow for possible extension at some point in the future to cover all steaming bays and connect with the existing workshop roof.
Several structure designs have been considered and a single option is now proposed and described here. When considering which solution should be adopted consideration was given to ease of construction and cost.

It is important that the location of the base for each support is agreed prior to starting the replacement of the steaming bay concrete base if each column is to be cast into the new concrete base. The preferred alternative is to bolt the roof supports to the new concrete base as described on the previous page This will allow the position of the roof columns to be decided and installed at a subsequent stage of the refurbishment.

This solution utilises a basic Scaffold pole structure to support a site fabricated roof truss. Extensions on either side of the roof could be added at a later date if deemed necessary. The basic reason for this arrangement reduces the overall span of the structure between supports but maximises the covered area. The uprights will be covered using a 100mm plastic tube filled with concrete. The final detailed design of the roof is currently being developed.

The example structure described here is very similar to the structure found on the columns supporting the roof at the coach.
The roof will be a lightweight steel cladding supported by longitudinal purlins. A typical example of this is CLADCO (or similar) 32/1000 Box Profile sheeting 0.7 Thick with a Polyester Paint Coating

Guttering will be required each side and method of a rainwater collection defined. The gutter is shown on the drawing inside the outer board, but this can be simplified by placing on the outer face. At the base of each column the plastic outer cover should extend into the base concrete. A wide base as can be seen on the GLR canopy should not be considered as it will further restrict the access space between the column and the adjacent steaming bays.

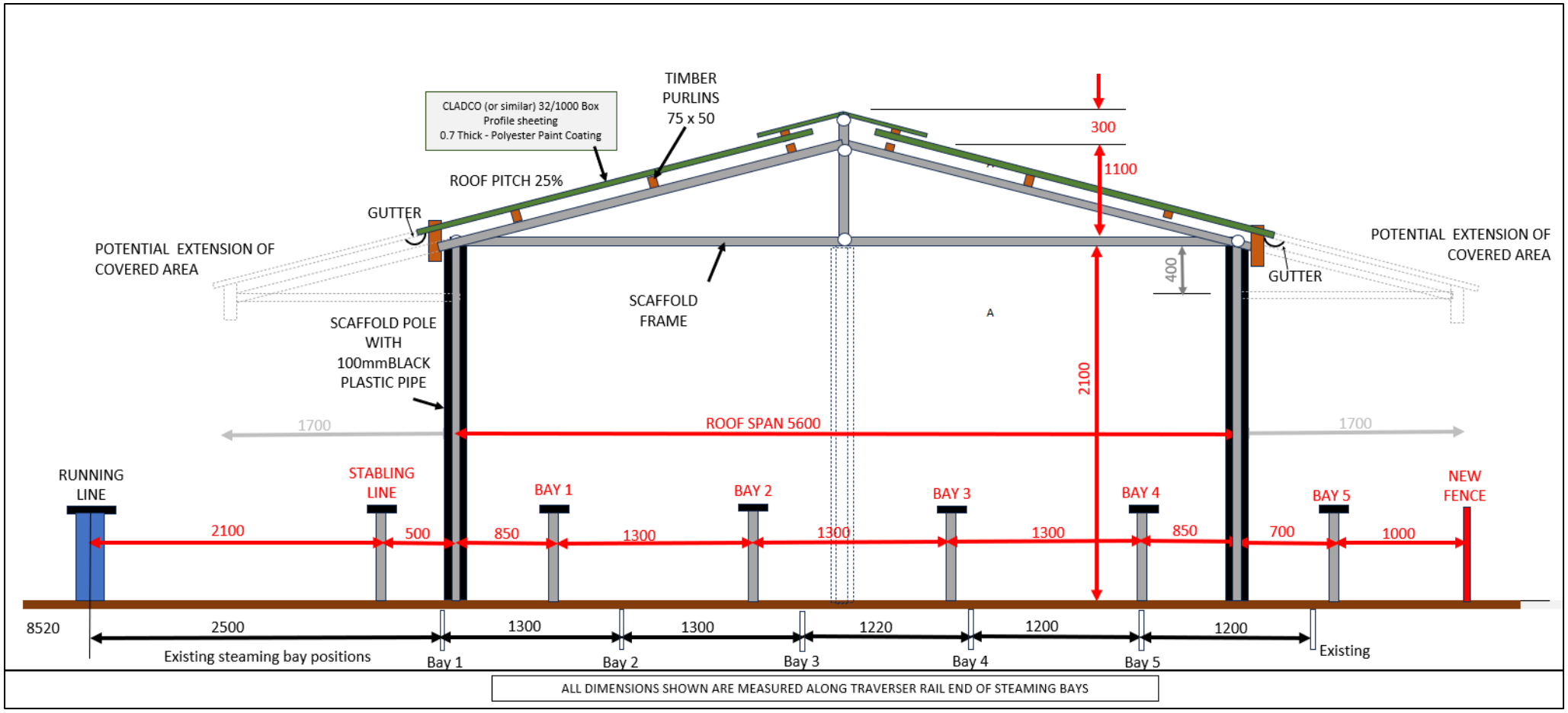
The roof will be vented at the ridge. This can best be described with this picture.

The main advantage of this solution is it can be easily fabricated on site. NLSME roof could look similar.

The picture shows the vent arrangement at Welling MES.

The Welling arrangement also incorporates a system for collecting rainwater from the roof. This will also need to be considered as part of the roof design for our site.

This solution relies totally on a scaffold pole structure. This is a simple structure and provides a higher ceiling within the support span and the same clearance on the outer extensions. The structure will require cross bracing for stability. This detail is not shown.



Although simple to construct it may not be the cheapest solution unless a second-hand supply of scaffolding can be sourced. The supporting columns will be covered using a 100mm plastic tube filled with concrete.

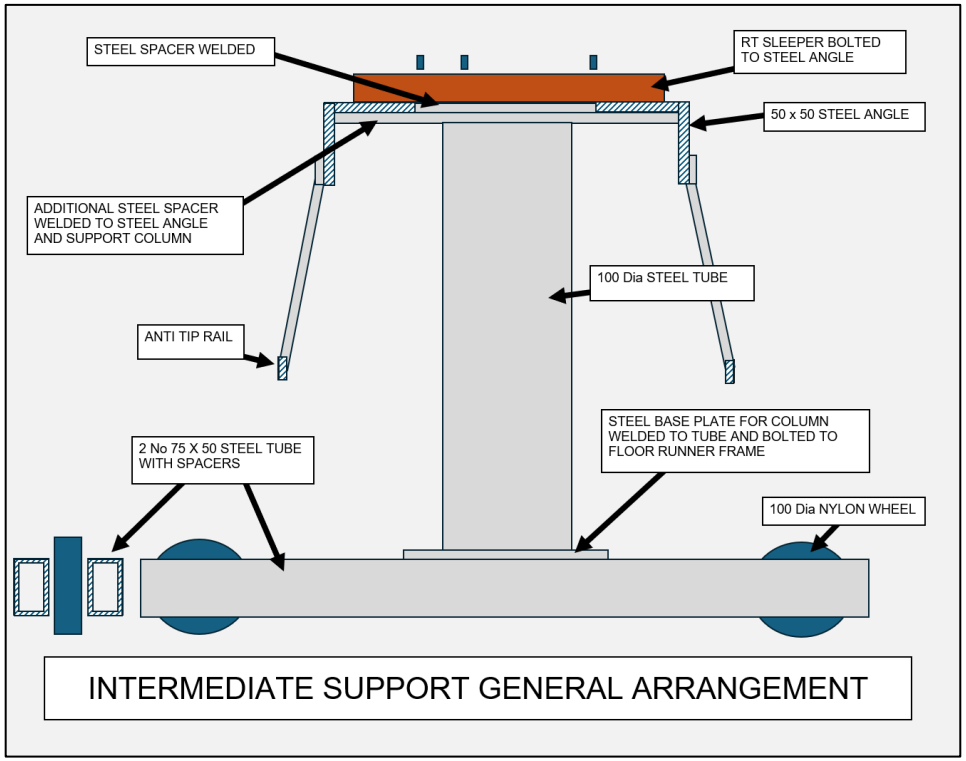
The detailed design of the roof structure is currently being developed.

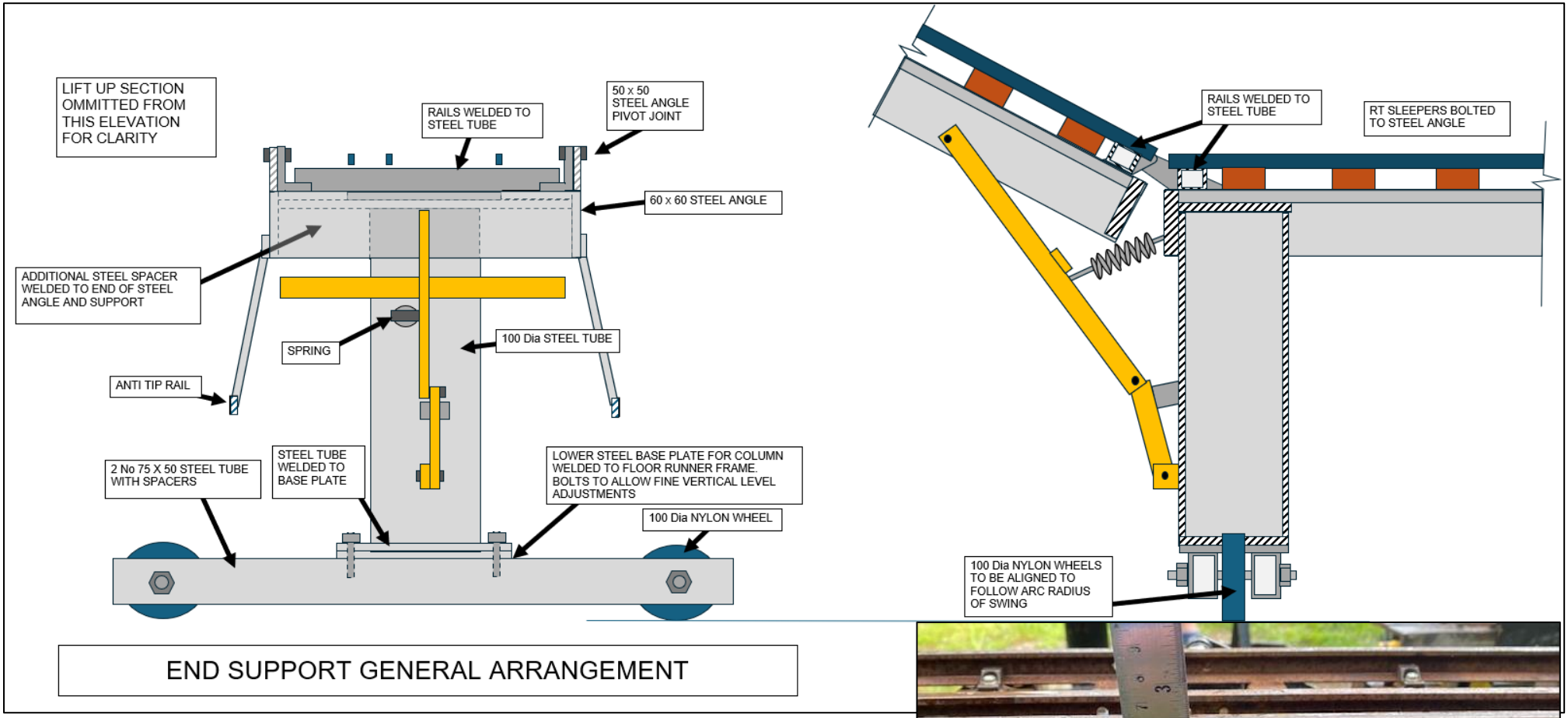
Raised track new connection – (Option 2 is considered to be the preferred solution)

Two options have been considered in detail and both are described here. The club has a part-built traverser which it has been decided is the best solution if relocated and cut down in length to accommodate a locomotive and a single passenger coach. Both options give the same functionality. The traverser solution is considered to be the easier to construct and operate.

Option 1 – Swing out section

The swing out section inserted into the main line would enable a loco and carriage to be assembled prior to joining the raised track. In reverse the engine and carriage could leave the raised track before being uncoupled. The position of the swing out section has been determined by the alignment of the spur line.
Various solutions have been considered by visiting other societies and other sources. The solution adopted by Welling MES is considered the most suitable solution to be considered. The pictures used in these notes are from the Welling track.
The swing section is hinged at one end (A) and has a simple drop-down locking section at the other (B)





There is a short lift-up section on the free end of the swing out section which acts as the locking mechanism when in the lowered position to pass a train. This is held in the raised position by the simple bar arrangement shown in yellow on the drawing above.

The pivot for the short lift section is best described in picture 2.

Pictures 3, 4 & 5 show the hinges from above and the lift-up in the raised position. The method of locking the swing out section in the running line position or when connected to the spur line is the same. The yellow bar shown in the drawing above is moved to allow the short section of inclined track to drop and lock into position.

4

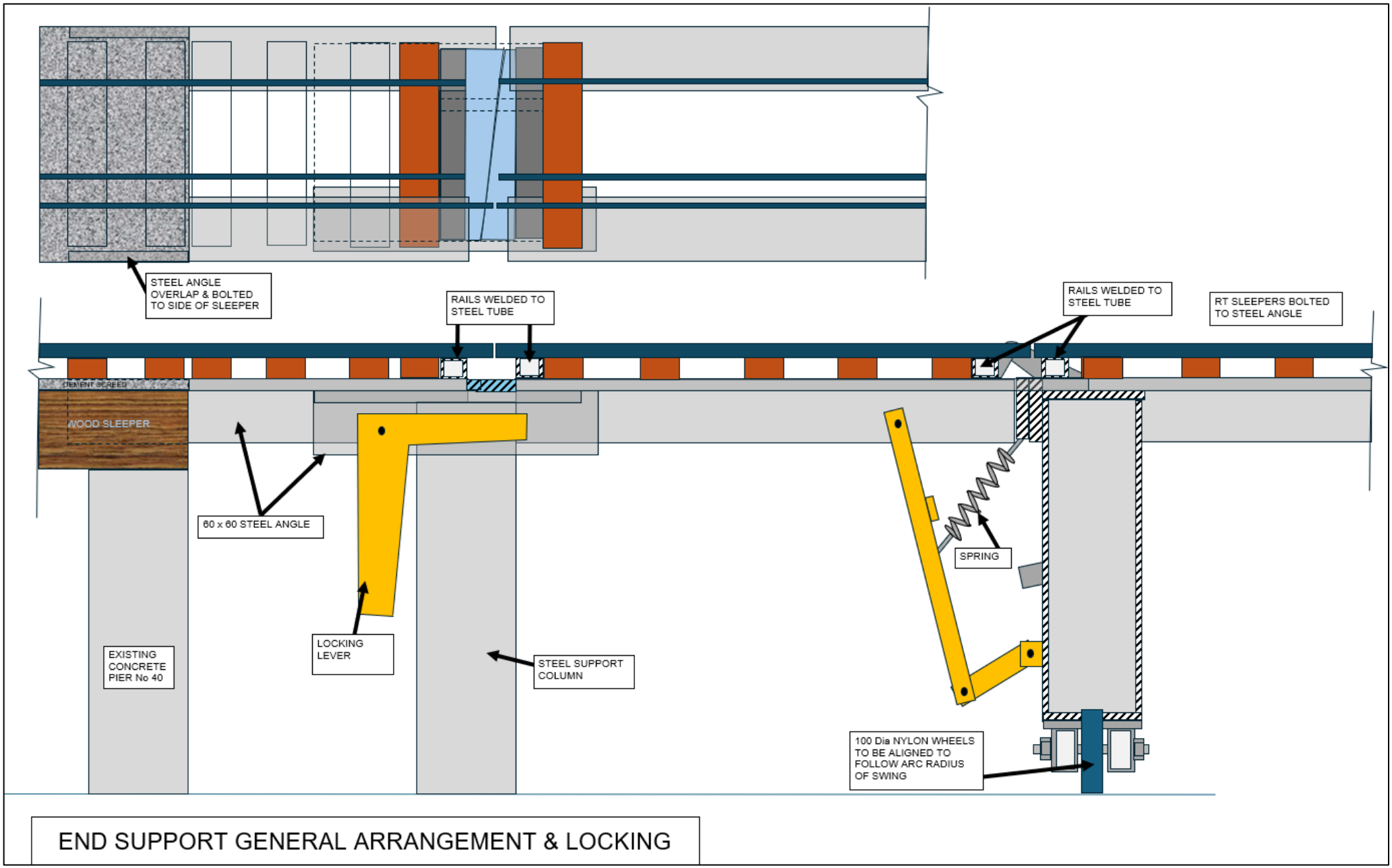
3


5

When the lift-up section is dropped down it engages with the fixed end of the raised track. It rests on a bearing plate (photo 6) and is aligned by the steel angle sections each side (photo 7 & 8). There are fine adjustment bolts either side and a yellow locking leaver (photo 6 & 9)

8

9



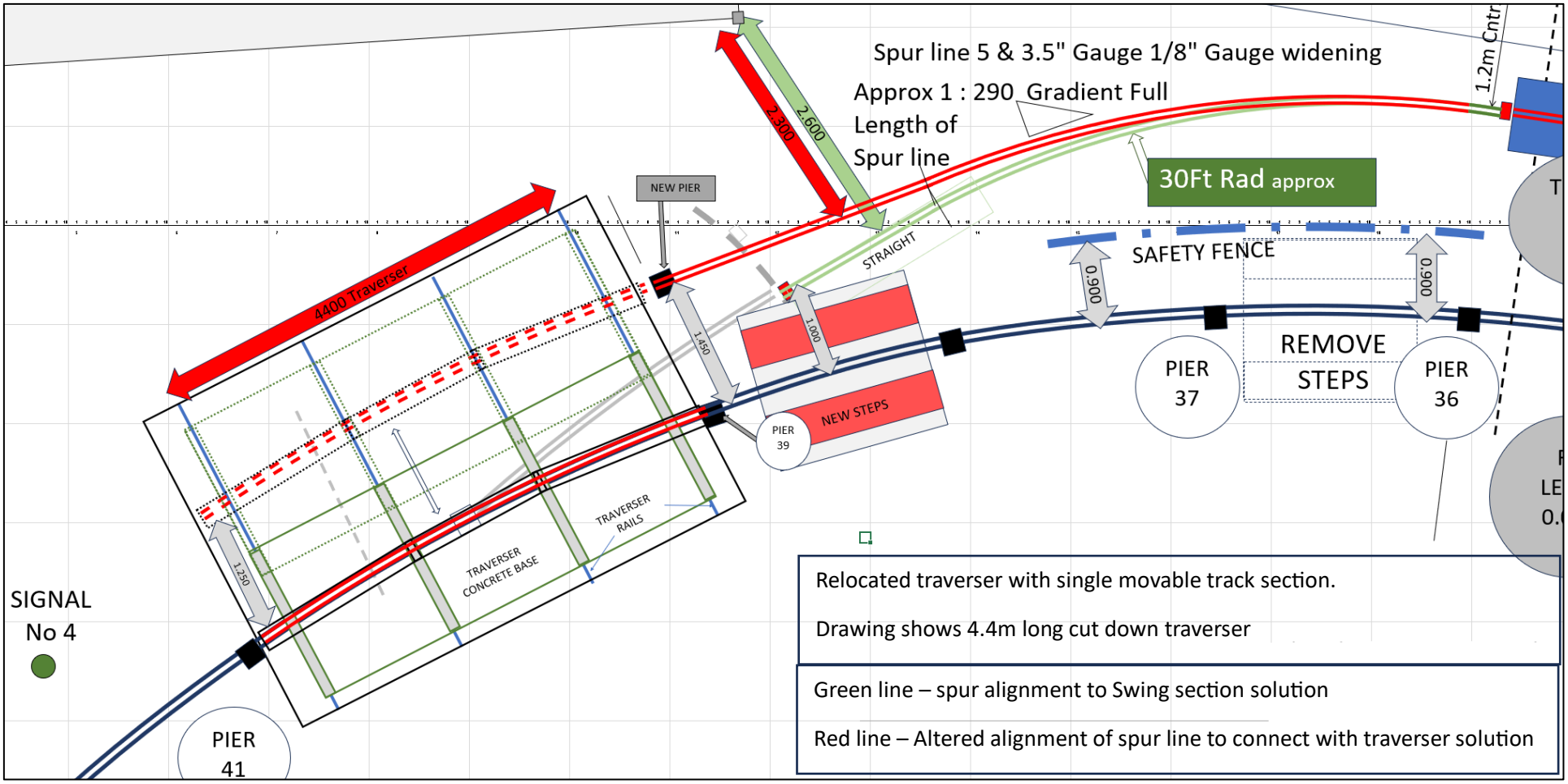
END SUPPORT GENERAL ARRANGEMENT & LOCKING

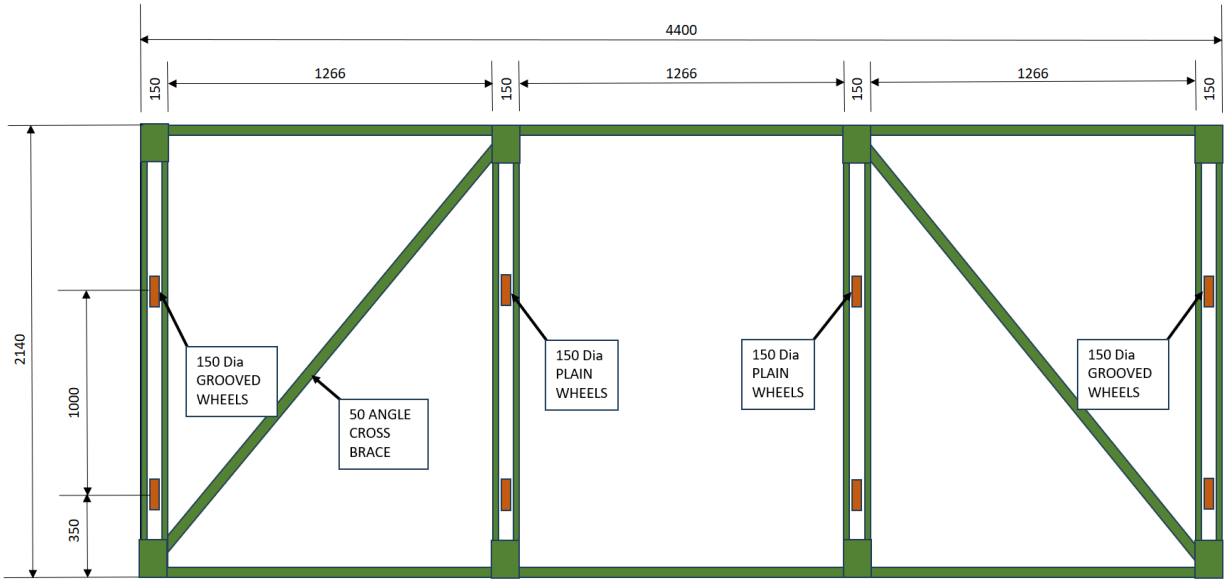
There is a need for a simple stop plate at certain locations. The very simple arrangement proposed is shown in pictures 10 & 11.

The pivot end of the swing out section is also a simple arrangement as shown in the pictures 10 & 12

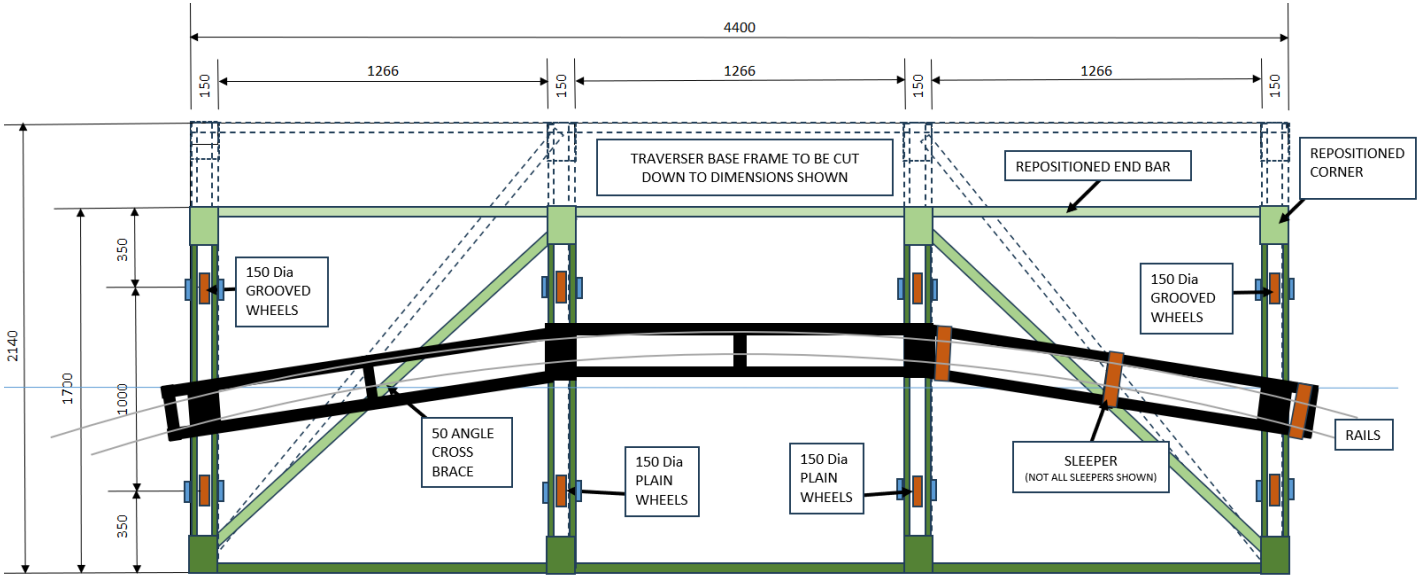
Option 2 Relocate the existing part-built traverser – (Preferred solution)

The society does have a part-built traverser which it has been concluded is in the wrong location. It is however a viable proposition to relocate it in a cut down form as shown on the drawing below. It can fulfil the same function as the proposed swing section solution. This traverser base frame is currently 4.4m long which could be reduced if considered necessary. This solution is viable and has the advantage of being less complicated to construct, It is part built and would provide step free access when the RT is not in use to the G1 railway. This solution requires no alteration to the signalling protection described for the swing out section. Details of the design require further development, but the following drawings should provide enough detail a decision on which option is to be progressed to be made. This drawing shows the traverser length 4.4M. Final length yet to be decided





BASIC LAYOUT AND DIMENSIONS OF EXISTING UNUSED TRAVERSER FRAME

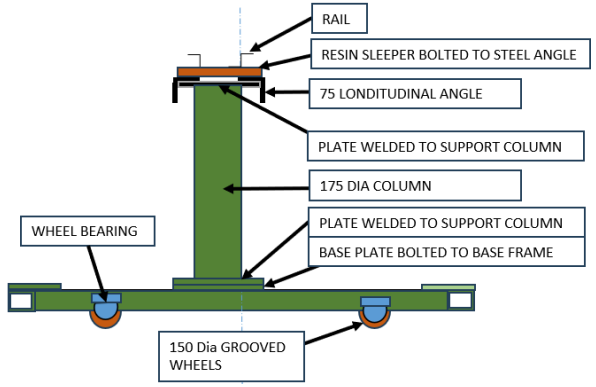


PROPOSED MODIFICATIONS & DIMENSIONS TO EXISTING UNUSED TRAVERSER FRAME

Traverser with single movable track section.

Column support arrangement yet to be developed in detail

Drawing shows 4.4m long cut down traverser



Signalling for new swing out section or relocated traverser

The description outlined below is applicable to both the swing out section or the relocated traverser options.

There are two operating conditions to consider, one with operating colour light signals and the other with no colour light signals in operation.

With signals

The existing traverser relies upon the following for safety:

1. If a train leaves the station signal 3 will wig-wag with audible sound to alert steaming bay not to use the traverser.

2. If the tack immediately after the station is not occupied, then operating the traverser over the line will cause a mechanical somersault signal to go to stop and colour light signal 2 will go RED. There is also a single RED at the base of the somersault signal pole which will also go RED In total there are three RED aspects and a somersault signal at signal 2 position. The station signal will show a YELLOW aspect.

This operation has been deemed to be safe for many years. However, there is a small risk arising from concurrent operation of the traverser and a train leaving the station which would present a RED aspect to an approaching train without the driver having previously seen a YELLOW aspect at the station. The length of track for the driver to take braking action is well over any minimum distance required to stop a train under such circumstances.

The above principles can be applied to the addition of the second traverser with some added safety features.

Operationally the two traversers should not be allowed to operate at the same time as it would place two trains in the same block section. Whilst this in not strictly unsafe as visual line of site exists, it does present a hazard risk if the train at the rear has an uncontrolled start and runs into the rear of the train in front.

To manage this risk each traverser should have its own wig-wag signal both fitted with an additional RED aspect to be lit when the other traverser is in use to signify to the steaming bay not to operate that traverser. Another reason for the additional wig-wag at the new traverser is there is no line of sight acceptable from the operating point of the new traverser to the existing wig-wag.

Operationally the existing signalling can be modified so the two wig-wag signals operate in parallel, and the semaphore signal can also be operated by a second wire in parallel with the existing one as one will go slack when the other is operated.

The control table for the signalling will thus look as follows:

Signal number				Track circuit			Traverser	
1	2	3	3A	A	B	C	1	2
G	G	-	-	C	C	C	Out	In
R	G	RR	RR	O	C	C	Out	In
Y	R	RR	RR	O	C	C	Out	In
Y	R*	-	R	C	O	C	In	In
Y	R*	R	-	C	O	C	Out	Out

Notes:
Traverser 1 is existing and Out when OFF the track and IN when over the track.
Traverser 2 is new and IN when connected to main track and OUT when connected to spur.
Signal 2 requires an interlock to RED if traverser 2 is not locked in place to IN
R* indicates semaphore signal operated in addition to RED aspects.

The above control table is incomplete at this time as it does not cater for Signal 4 interaction with the new arrangement which it will have to do so that if Track C is occupied then Signal 4 will be RED with implication on use of traverser 2. (To be expanded).

Without signals

The existing traverser relies upon the mechanically operated semaphore signal to provide safety for when the traverser is in use. This has proven to be less than 100% safe due to drivers either not appreciating the signal is an operational signal or simply not seeing it due to its high position or just not obeying it.

Whilst a train running into traverser 1 is of significance a train running into an open space at traverser 2 is arguably of greater significance and protection needs to be applied.

Options:

1. Interlock traverser 2 so that it cannot be moved unless signals are in use. Not wholly safe as signals may be on but no signals in place although RED at the base of semaphore will be operational.
2. Add a low-level semaphore at signal 2
3. Have a mechanically operated signal at traverser 2 position.

A physical stop device in the line is discounted as it produces a similar situation as traverser 1 being across the line.

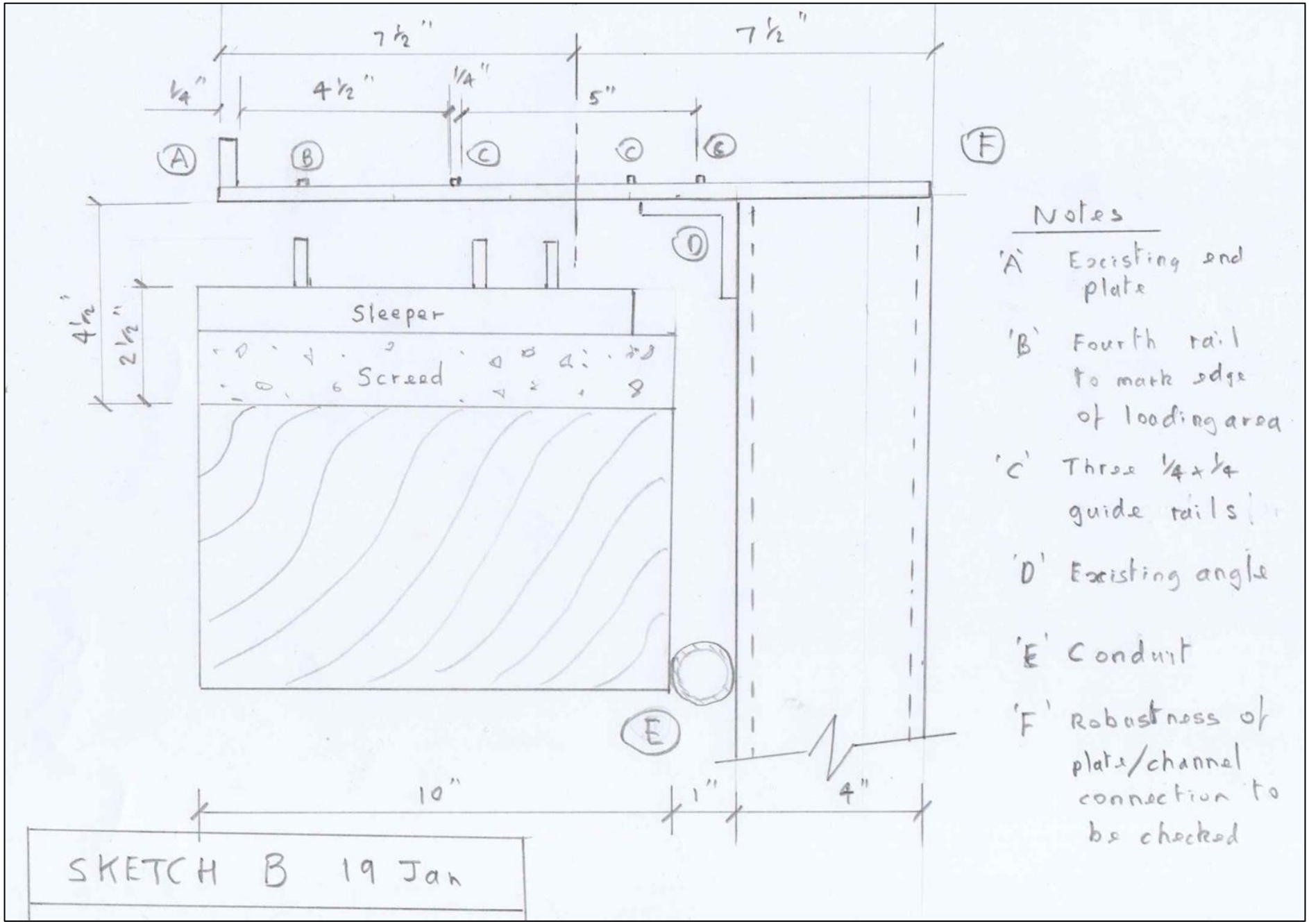
Alterations to existing traverser

The existing traverser must be modified. This will allow it to accommodate locomotives in the usual way but also facilitate the transfer of passenger carriages from the new storage area in the old workshop onto the carriage stabling line and onto the connecting line to the swing out section and the side skirts of our passenger carriages. The plate must have guide rails for the passenger cars to ensure bogie wheels align with the steaming bay and/or spur line rails (guides shown on sketch). However, these guides may hinder use when transferring locos onto track in our conventional way (see notes 4 & 5 below)

The passenger carriage inside dimension between valences at rail height is 16 inches. This would require the maximum width of the traverser plate of 15 inches to give a bit of clearance. It will be necessary to cut away 2.5 inches of plate from the rail side and all on steaming bay side to be flush with uprights.

A few points regarding the modifications that need more explanation:

1. The carriage guide rails need only be low profile, ¼ max possibly only 3/16. (Note C)
2. The existing loading/offloading ramp remains as existing.
3. A fourth guide rail (B in the notes) can be added to aid alignment for ramp rail to rail offloading but, if we continue to use the existing ramp, which does not have rails this may not be necessary.
4. 5-inch gauge locomotives using the offloading ramp will need to straddle the inboard carriage guide rail.
5. 3.5-inch gauge locomotives using the offloading ramp will fit within the 4.5inch space between the end plate (A) and inboard guide rail.
6. The offloading ramp locating peg, presently at the inboard edge of the plate will need to be moved and a corresponding new slot cut into the plate.
7. The connection between plate and columns needs to be checked as we will be removing one of the supports 2” x 2” angles at this point
8. It would be further improved if the conduit is repositioned. That would also prevent damage to the conduit.

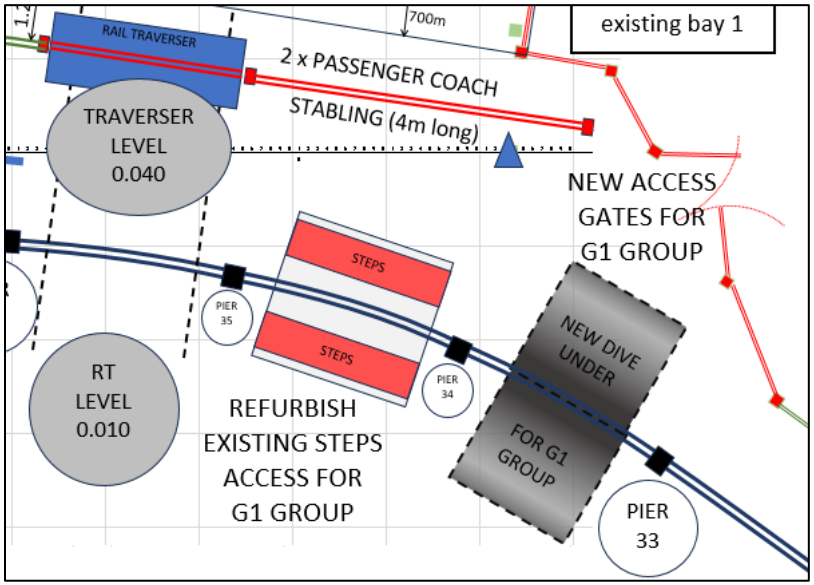

7½"
7½"
¼"
4½"
¼"
5"
A
B
C
C
E
F
D
4½"
2½"
Sleeper
Screed
E
10"
1"
4"
Notes
'A' Existing end plate
'B' Fourth rail to mark edge of loading area
'C' Three ¼ x ¼ guide rails
'D' Existing angle
'E' Conduit
'F' Robustness of plate/channel connection to be checked
SKETCH B 19 Jan

G1 new access

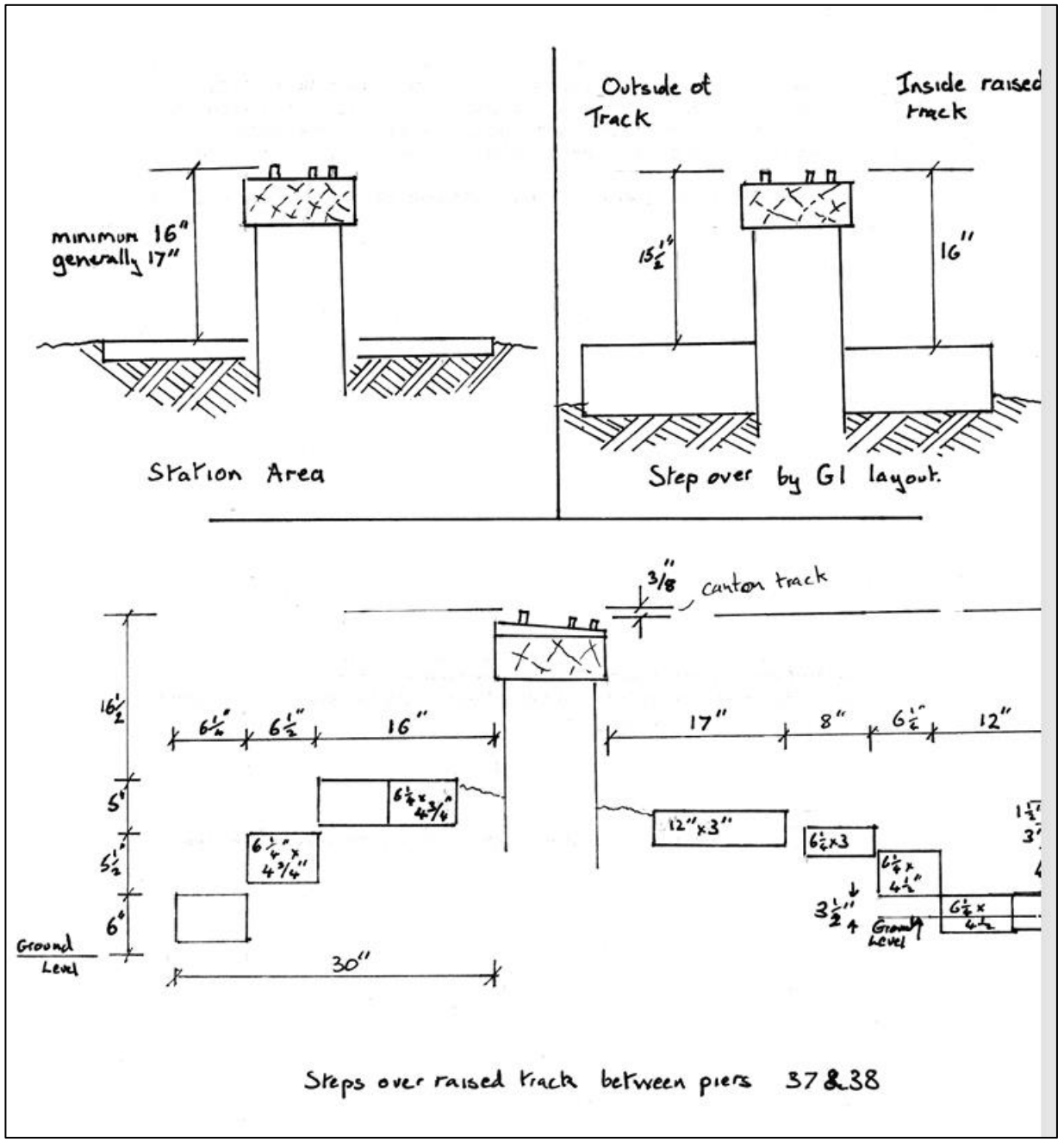
It is proposed to relocate the steps between piers 34 & 35 as shown on the plan drawing. In addition, a new dive under will also be installed between piers 33 & 34.

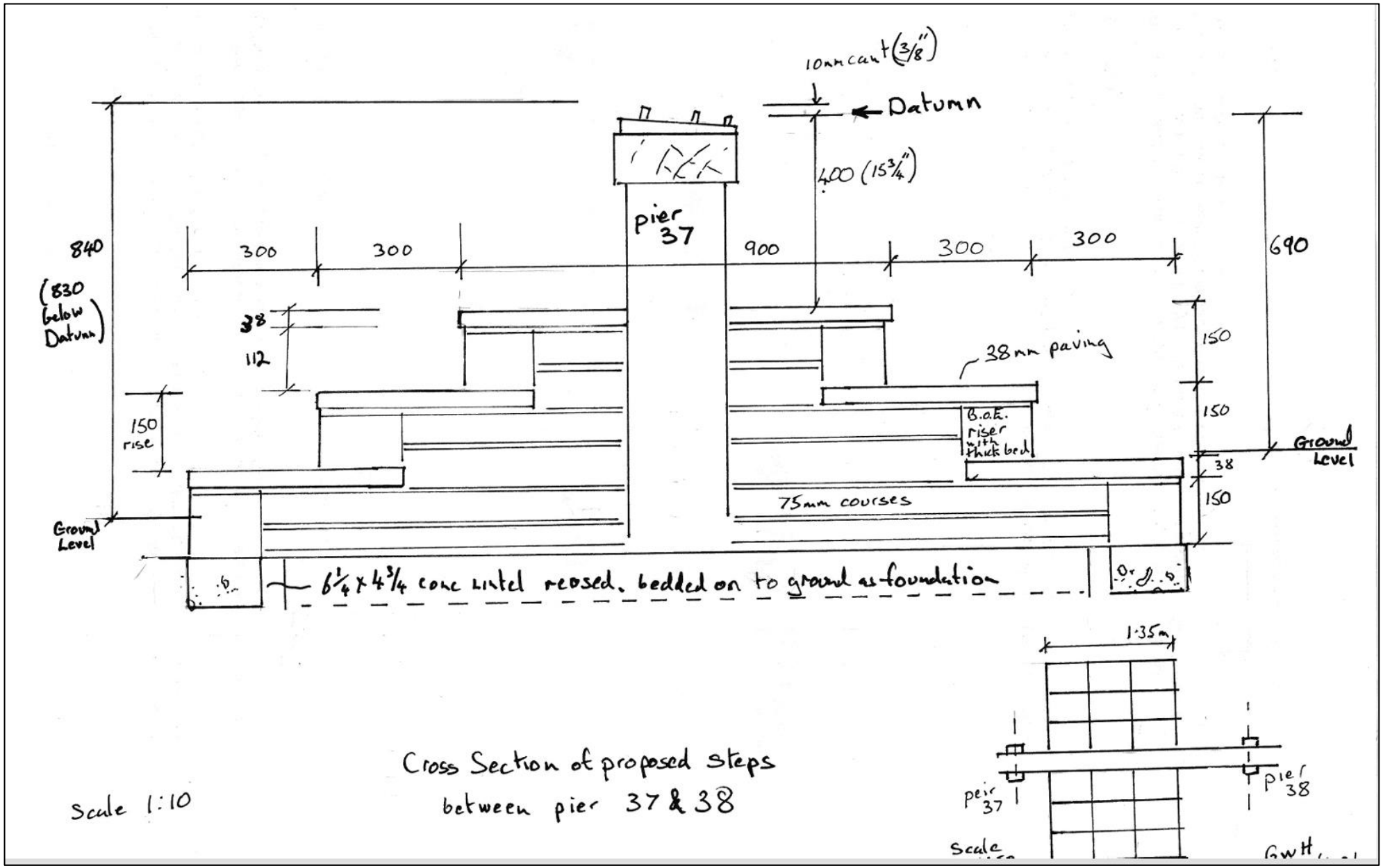
These drawings are based on a survey undertaken by G Hammond on 24/10/24.

These are to allow the G1 group to cross the raised track. Once the steaming bay project is complete step free access will also be available for the G1 group via the swing out or traverser section of the RT when in the open position. This will be a welcome feature for the G1 group and remove the need for the lift out handrails which yet to be agreed due to safety concerns when running the RT.



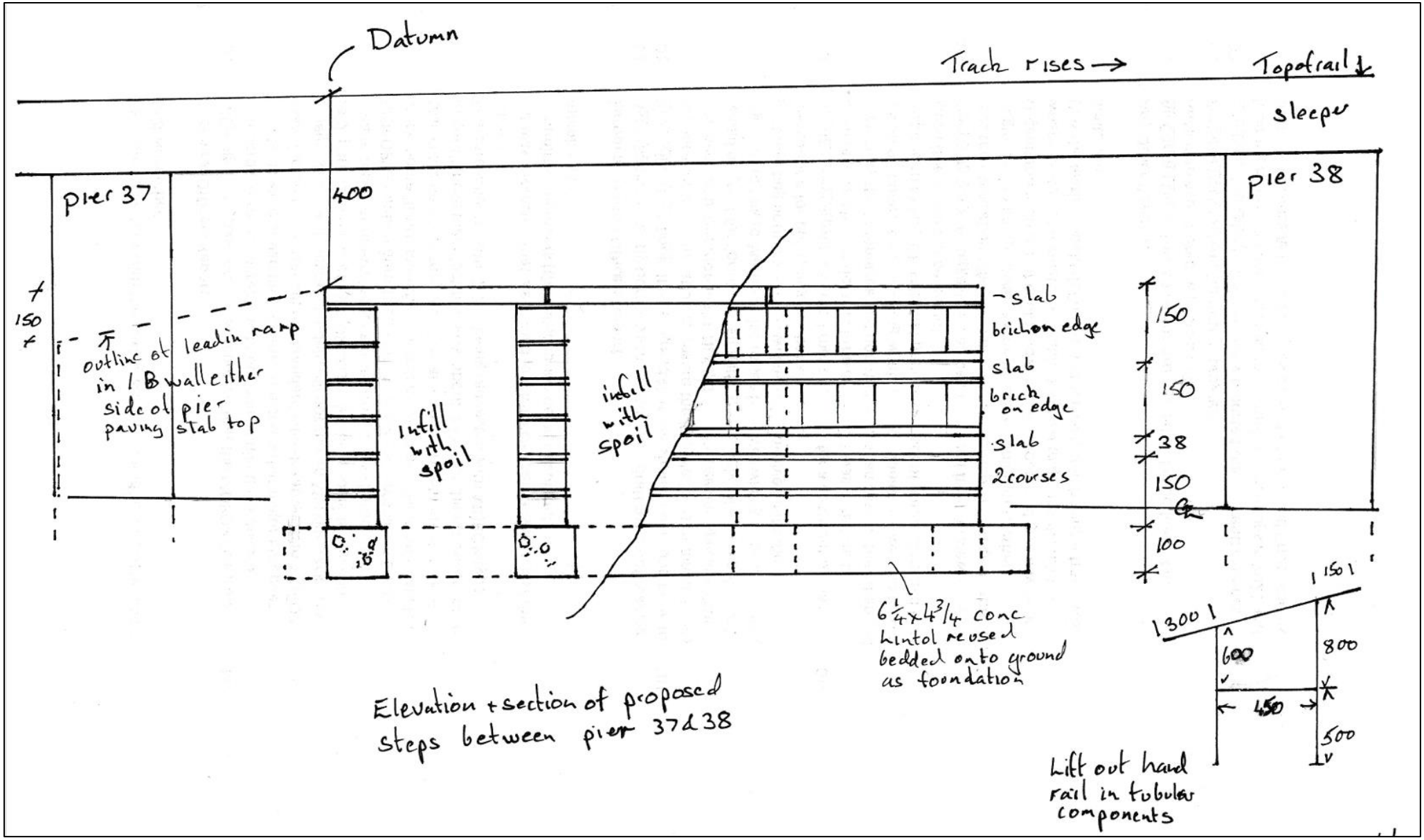
The following drawings describe the proposed steps which will be constructed by the G1 team.





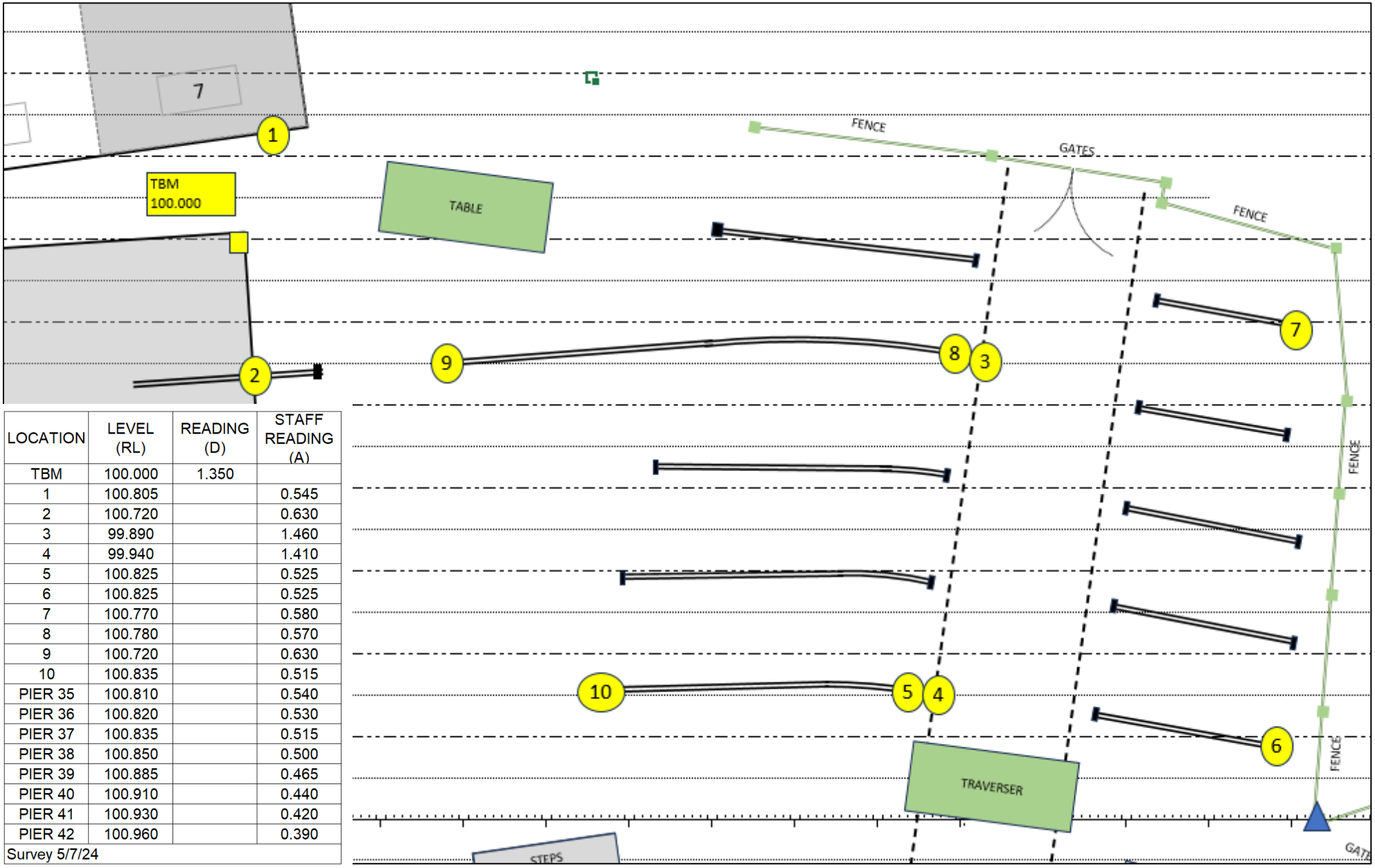
Cross Section of proposed steps between pier 37 & 38

Scale 1:10



Elevation + section of proposed steps between pier 37 & 38

Existing Track Levels



LOCATION	LEVEL (RL)	READING (D)	STAFF READING (A)
TBM	100.000	1.350	
1	100.805		0.545
2	100.720		0.630
3	99.890		1.460
4	99.940		1.410
5	100.825		0.525
6	100.825		0.525
7	100.770		0.580
8	100.780		0.570
9	100.720		0.630
10	100.835		0.515
PIER 35	100.810		0.540
PIER 36	100.820		0.530
PIER 37	100.835		0.515
PIER 38	100.850		0.500
PIER 39	100.885		0.465
PIER 40	100.910		0.440
PIER 41	100.930		0.420
PIER 42	100.960		0.390
Survey 5/7/24			