MOTT MACDONALD

Hybrid Rail Study
San Bernardino County Transportation Authority

Appendix C – Maintenance and Service Facility Design Memo

1 Introduction

This technical note describes a generic maintenance facility layout for the maintenance of up to 15 Stadler Flirt diesel multiple units (DMU) optimized to provide the facilities required. It has not been designed to a given space and assumes available land take is not an issue. Two options have been provided for two differing unit lengths as detailed in the facility concept drawings in Appendix 5.2. These options differ in overall shape, and track layout and occupy differing surface areas. The vehicles are illustrated in the following figures from the TexRail project in Fort Worth, Texas, which is slated to open in late 2018.

Figure 1-1: Stadler Flirt (TexRail)

Figure 1-2: Stadler Flirt 5 Module, 4 Passenger Car Variant

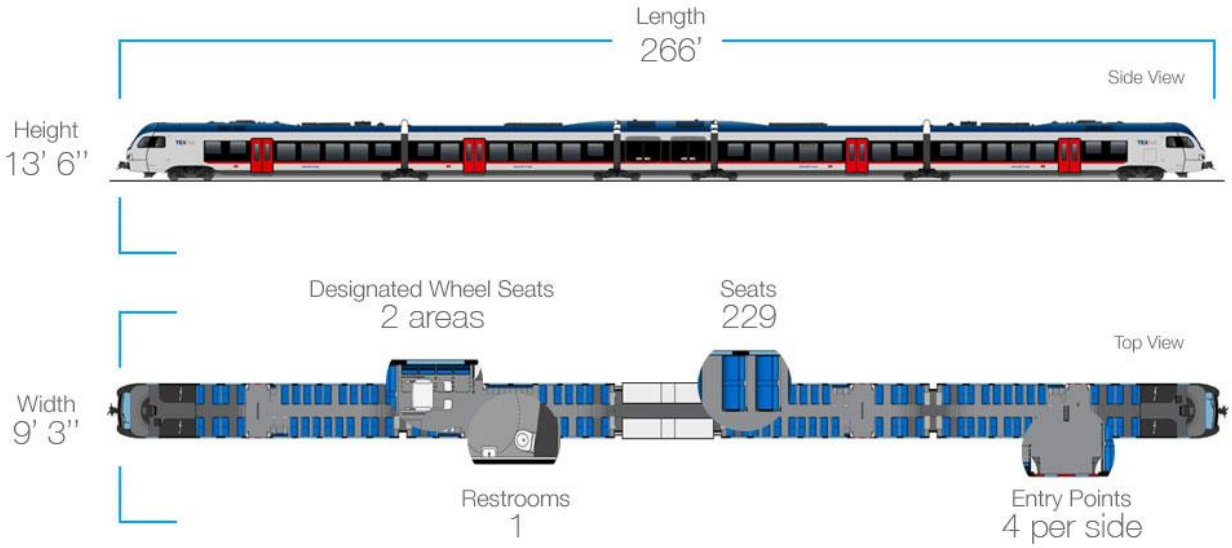
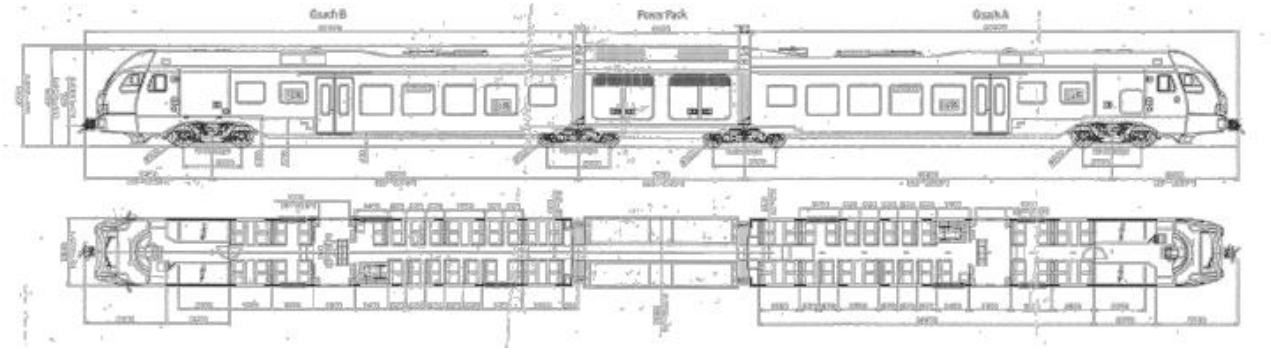


Figure 1-3: Stadler FLIRT 3 Module, 2 Passenger Car Variant



2 Design Criteria

The conceptual facility has been designed to meet the following criteria:

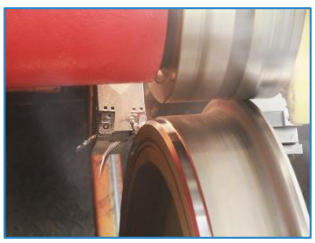
- Minimum track curve radius 492 feet
- Minimum track spacing 25 feet for road vehicle access, or 15 feet for non-road vehicle access
- Two variants of unit length:
  - 4-car unit, approximately 164 feet per Figure 1-2
  - 2-car unit, approximately 266 feet per Figure 1-3
- Minimum road vehicle access road width 13 feet
- No. 10 turnouts have been used throughout
- Storage tracks for up to 15 units
- Phased approach - To accommodate the phased introduction, it is envisaged that the workshop, wash plant, fuel point, and at least one storage siding will be required for the initial 3 train sets. Additional storage sidings can be added as the fleet expands. It may be more cost effective to construct the complete depot track layout as part of one construction. Installing additional storage tracks after the first phase to accommodate more units would require the installation of additional turnouts to provide access to the storage tracks. This would be disruptive to the operational facility and potentially more expensive than installing these as part of the initial construction.

3 Facilities

3.1 Wheel lathe

Provision has been made for an underfloor wheel truing machine located such that its use should not restrict access to the two maintenance roads when in use. All truing can be carried out within the workshop building providing a constant climate for operatives while minimizing the transmission of noise beyond the building.

Figure 3-1: Wheel truing



3.2 Wash Plant

Provision is made for a wash plant but to no specific manufacturer's design.

Figure 3-2: Drive Through Wash Plant

The drive through wash is positioned on the primary inlet road to the depot allowing the units to be washed before storage or maintenance activities take place when leaving service.

Advantages of a drive through wash plant:

- Wash building is considerably reduced therefore requiring less space.
- Permits units to be washed before entering storage or maintenance tracks.
- Reduced time for wash process.

Disadvantages of a drive through wash plant:

- Could be prone to malfunction during periods of extreme weather.
- Wash process is uncontrolled and quality of clean may be compromised if the unit speed is not consistent through the wash.
- Units would need to come to a stop when the front and rear cabs are being cleaned.

3.3 Internal cleaning and toilet waste

Provision is made for truck access between each stabling road to provide access for internal carriage cleaning and removal of effluent by road vehicle.

3.4 Fuel point

Provision is made for a fuel point but to no specific manufacturer's design and assumes that refuelling is to the center module of the unit. Provision of a facility for toilet effluent removal could also be provided at this location if required as an alternative to removal by portable plant/road vehicle

Figure 3-3: Fuel point

3.5 Workshop Facilities

The workshop is sufficiently sized to accommodate the offices and domestic accommodation for staff and drivers provided but these will need to be ratified as part of a detailed design.

The workshop also has sufficient space for the necessary stores and workshop areas: mechanical and electrical.

Workshop space is available at the end of the two maintenance roads for off unit maintenance larger items of equipment e.g. bogie and engine power packs. This area will require the provision of overhead crane and hoists.

Figure 3-4: Overhead Crane and Heavy Maintenance Area

3.6 Maintenance Bays

Two maintenance bays provided, light (progressive) and heavy (overhaul), are considered sufficient for a fleet of 15 units and up to 30 units if necessary.

Figure 3-5: Stadler FLIRT Power Unit

3.6.1 Unit assumptions

The following assumptions have been made regarding maintenance requirements:

Bogies/trucks will be removed utilising a jacking facility with either mobile jacks or a lifting beam. An alternative would be a bogie drop if preferred.

- Because the Stadler Flirt is a low floor unit, roof access is provided on the light maintenance bay as it is likely some equipment will be mounted on the roof;
- Diesel engine power packs are removed via a fork lift truck.

Figure 3-6: Stadler FLIRT Power Unit Access and Removal by Fork Lift Truck

3.6.2 Progressive Maintenance Bays

It is anticipated that the progressive maintenance bays are required to accommodate the following activities as a minimum:

- Underframe inspections and equipment servicing;
- Roof inspections and equipment servicing;
- Interior inspections and equipment servicing;
- Exterior inspections and equipment servicing;
- Fault finding and defect rectification;
- Light repairs;
- Modifications;
- Special checks; and
- Unit testing and commissioning.

Figure 3-7: Roof access

3.6.3 Heavy Maintenance / Overhaul Bay

It is assumed that the heavy maintenance bay will be utilised primarily for the removal of large equipment for overhaul or defect rectification purposes. It is assumed that the majority of large equipment items with the exception of the trucks will be mounted above the sole bar.

It is assumed the removal of the trucks will be completed by raising the unit via mobile jacks however other mechanisms such as bogie drops or lifting beams could be suitable alternatives.

It is important to consider the availability of space to disconnect and reconnect equipment such as bogies to the unit after exchange or repair for example by ensuring pit depths are adequate.

Figure 3-8: Mobile Jacks

The heavy maintenance bay will require sufficient room to access all areas of the unit by the chosen method of equipment removal e.g. allowing for the turning circle of a fork lift truck. As this information is not currently known we have made assumptions.

Equipment mounted above the solebar will be removed via a fork lift truck and roof mounted equipment removed by an overhead hoist assuming this equipment is not excessively heavy.

It is expected that in the event a unit incurs significant damage from collision, derailment or impact damage, repairs will be carried out off site at an external repair facility.

Figure 3-9: Underfloor Jacks

Figure 3-10: Lifting Beam

4 Operation

4.1 Throughput

Two track layouts are suggested as options A and B as illustrated in Appendix 5.2. It is envisaged that units will enter the depot from the main line on the left-hand side to pass through the fuel point and wash plant or bypass track. Units can then be directed to the storage tracks or workshop as required. A head shunt on option B provides access to the workshop but requires a reversing movement.

The storage tracks are single/stub-ended and could therefore suffer the adverse effect of a single point failure e.g. unit or switch failure trapping serviceable units which may impact the service. This is less of a problem for a large fleet where the proportion of spare units may be higher. A double-ended storage track would provide greater flexibility, but this depends on whether land is available.

Departing units are able to depart direct from the storage tracks but will require a reversal to access the main line in one direction for both options.

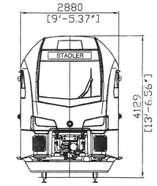
5 Appendices

5.1 Stadler FLIRT DMU Drawings

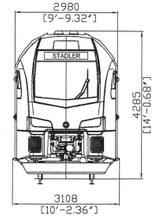
5.2 Maintenance and Service Facility Concept Drawings

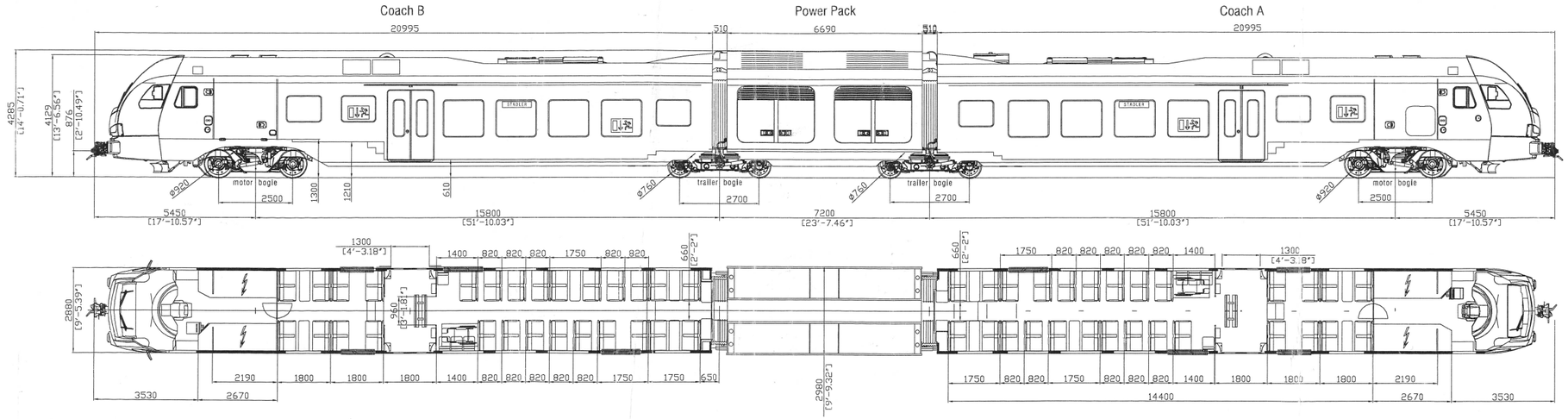
Attachment A

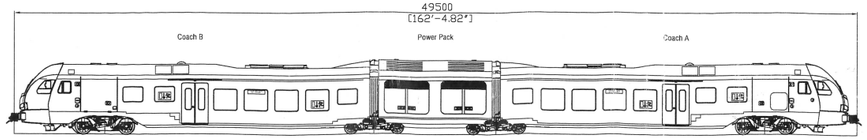
front view
only Coach A+B



front view
with Power Pack







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Document No.: 304.101

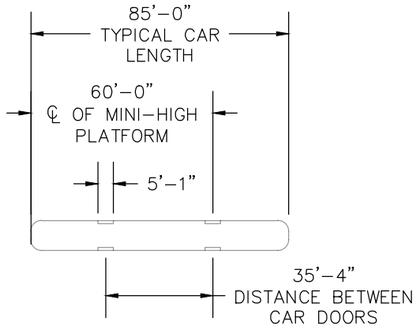
Emergency window

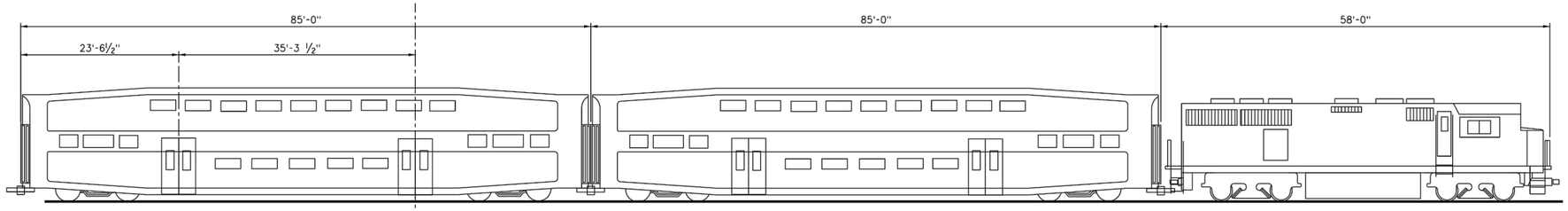
	B	A	TOTAL
FIXED SEATS	54	54	108
FLIP UP SEATS	4	4	8
TOTAL SEATS	58	58	116
STANDEES AREA (m²)	14.75	14.75	29.5
STANDEES (4P/m²)	59	59	118
TOTAL (fixed seats +standees)	113	113	226

	Datum	Name
Bearb.	10.03.2017	frejul
Gepr.	10.03.2017	

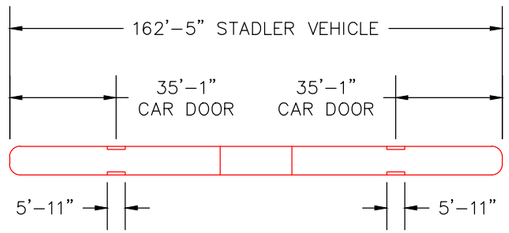
FLIRT³, DMU SANBAG
General Arrangement Drawing

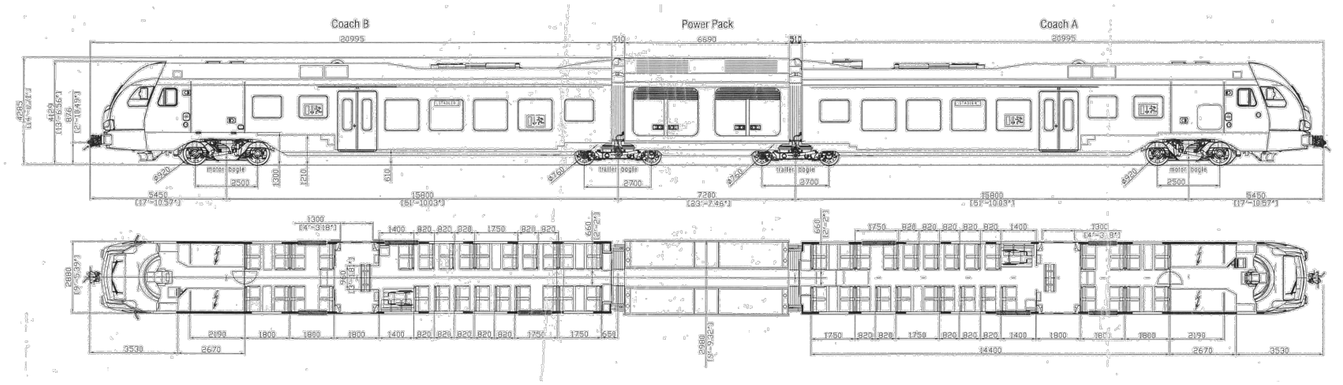
STADLER 521757 P-3675



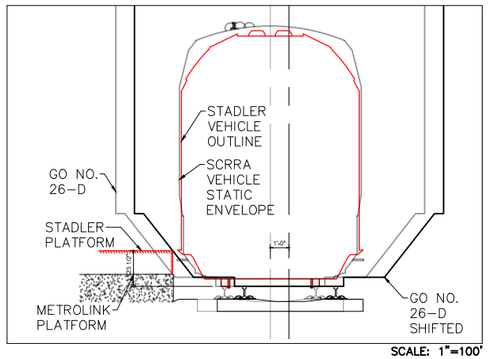


METROLINK VEHICLE





STADLER VEHICLE



VDE CLEARANCES

REV.	DATE	DESCRIPTION	BT / SUB	APP.

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
DATE: 10/06/2017

SUBMITTED: _____ APPROVED: _____

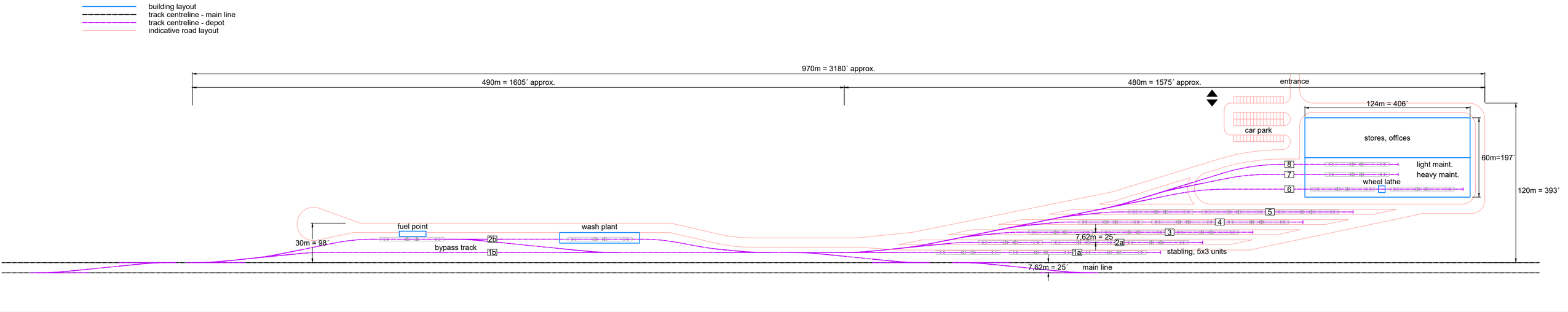
DMU-METROLINK CORRIDOR STUDY

STANDARD DMU AND METROLINK VEHICLES WITH VDE CLEARANCE

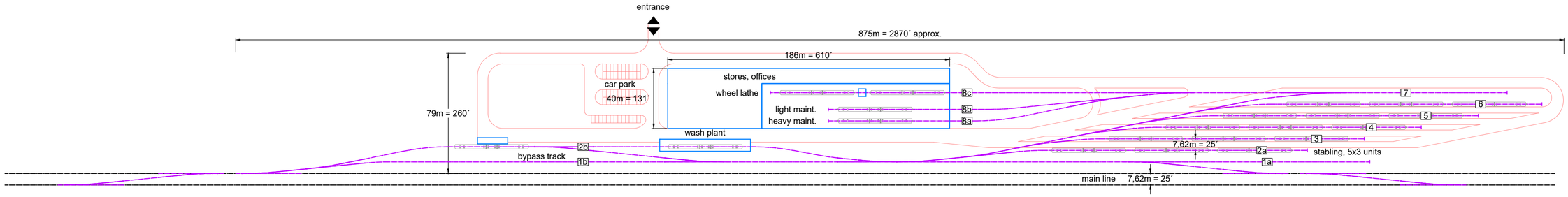
CONTRACT NO.
DRAWING NO.
REVISION | SHEET NO.
SCALE: NTS

DA#68196 Oct 18, 2017 – 11:41am C:\pwworking\lmm\vdl_lronalt\dst68196\lmm88883\309710-CV-DMU-StationOption.dwg

option A

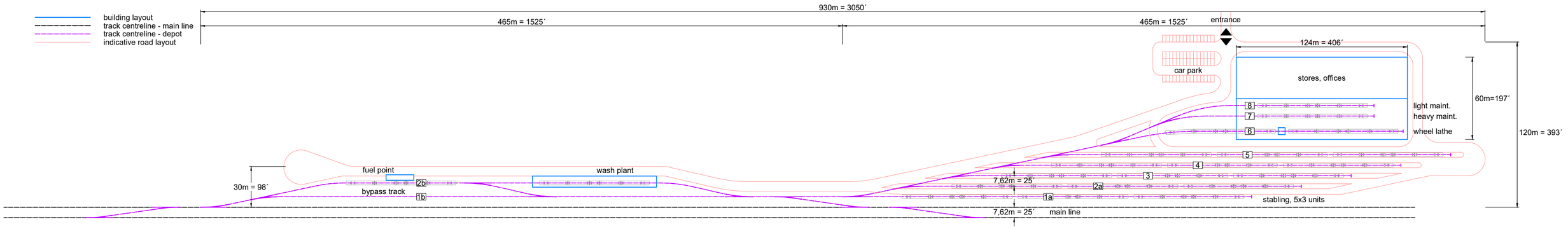


option B

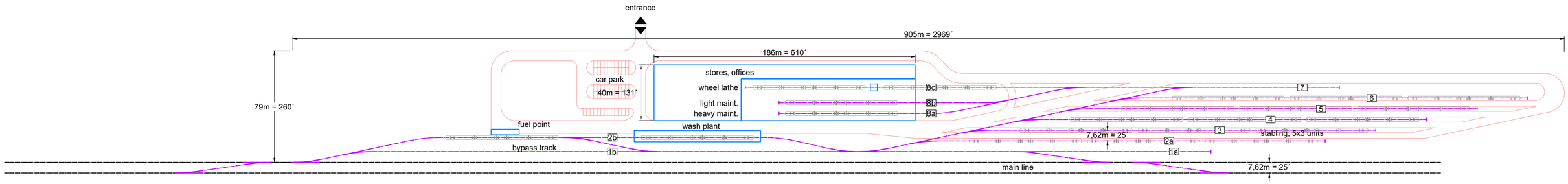


maintenance and stabling facility concept
2-coach + power pack units
1:2000 @ A2

option A



option B



maintenance and stabling facility concept
4-coach + power pack units
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