JUNAKALUSTO OY
Maintenance Depot Concept

HELSINKI, FINLAND
# TABLE OF CONTENT

1 INTRODUCTION ........................................ 3
  1.1 ROLLING STOCK ........................................ 3
      1.1.1 Technical Data .......................................... 3

2 SITE DESCRIPTION ........................................ 4
  2.1 LOCATION IN HELSINKI .................................. 4
  2.2 ILMALA DEPOT ........................................... 4
  2.3 MAINTENANCE TRACKS / STANDS .......................... 4

3 ALTERNATIVE LAYOUT SOLUTIONS FOR THE NEEDED FACILITIES ...... 5
  3.1 OPTION 1 – NEW BUILDING TO THE SOUTH SIDE OF OLD DEPOT (TRACK 762) ...... 5
      3.1.1 Main Challenge ........................................... 5
      3.1.2 New Building ............................................ 5
      3.1.3 Workshops ............................................... 6
      3.1.4 Storage .................................................. 6
      3.1.5 Flexible used Area ....................................... 7
  3.2 OPTION 2 – ALL FACILITIES INSIDE OF THE OLD SM5 HALL .............. 8
      3.2.1 Differences to Option 1 .................................. 8
  3.3 OPTION 3 – USE OF THE OLD OFFICE AND LOCKER ROOM FACILITIES .......... 9
      3.3.1 Differences to Option 1 and 2 ............................ 9

4 TRAIN CLEANING ......................................... 10
  4.1 SITUATION ................................................ 10
  4.2 CLEANING TOOLS ......................................... 10
  4.3 UPGRADE POSSIBILITIES ................................... 10
      4.3.1 Assumptions ............................................... 10
      4.3.2 Infrastructure ............................................ 10
  4.4 TRAIN ACCESS ............................................ 11
# 1 INTRODUCTION

## 1.1 ROLLING STOCK

The related rolling stock to be maintained in the dedicated workshop area is 81 Stadler Electrical Multiple 4-car Units (FLIRT EMUs, Sm5 trains).

### 1.1.1 TECHNICAL DATA

| **GAUGE** | 1524 mm |
| **DESIGNATION** | Sm5 |
| **CATENARY VOLTAGE** | 25 kV, 50 Hz |
| **AXLE ARRANGEMENT** | Bo’2’2’2’Bo’ |
| **NUMBER OF TRAINS** | 1<sup>st</sup> series: 32+9  2<sup>nd</sup> series: 34+6  Total: 81 |
| **SERVICE START-UP** | 2009/2010 |
| **SEATING CAPACITY** | 238 |
| **FOLD-UP SEATS** | 34 |
| **STANDING CAPACITY (4 PERS./M<sup>2</sup>)** | 340 (accord. to DIN 25008) |
| **FLOOR HEIGHT** |  |
| Low Floor | 600 mm |
| High Floor | 1120 mm |
| **DOOR WIDTH** | 1300 mm |
| **LONGTIDUAL STRENGTH** | 1500 kN |
| **OVERALL LENGTH** | 75200 mm |
| **VEHICLE WIDTH** | 3200 mm |
| **VEHICLE HEIGHT** | 4400 mm |
| **BOGIE WHEELBASE** |  |
| Motor Bogie | 2700 mm |
| Trailer Bogie | 2750 mm |
| **POWERED WHEEL DIAMETER (NEW)** | 870 mm |
| **TRAILER WHEEL DIAMETER (NEW)** | 800 mm |
| **CONTINUOUS POWER AT WHEEL** | 2000 kW |
| **MAXIMUM POWER AT WHEEL** | 2600 kW |
| **STARTING TRACTIVE EFFORT (UP TO 47 KM/H)** | 200 kN |
| **MAX. ACCELERATION (FULL LOAD)** | 1.2 m/s<sup>2</sup> |
| **SERVICE SPEED** | 160 km/h |
2 SITE DESCRIPTION

2.1 LOCATION IN HELSINKI
Ilmala Depot is located approx. 4.5 km north of Helsinki main station.

2.2 ILMALA DEPOT
The Ilmala Depot is currently managed and operated by the VR Group. A dedicated area of 4 tracks (8 stands, marked yellow) will be used in the future for independent maintenance of the Sm5 fleet.

2.3 MAINTENANCE TRACKS / STANDS
The current area dedicated for Sm5 maintenance already consists of four PM/CM stands on tracks 764 and 765, which will not need to be refurbished. Track 763 houses an existing lifting stand in south end and an overhaul stand in north end. Currently track 762 is mainly used for other than Sm5 trains. This is the area where most of refurbishments can take place. Offices, Workshops and Storage can be built in this area.
3 ALTERNATIVE LAYOUT SOLUTIONS FOR THE NEEDED FACILITIES

Sm5 hall is used currently only for maintenance activities. All other facilities (offices, storage, showers) are located in other parts of depot. In the new maintenance concept those facilities have to be separated from VR facilities. This document presents three alternative options to arrange new facilities.

3.1 OPTION 1 – NEW BUILDING TO THE SOUTH SIDE OF OLD DEPOT (TRACK 762)

New facilities will be located partly in the old Sm5 hall and partly in a new building. The new building will be built on top of track 762, about five to 10 meters from the south side of old depot building. (Appendix 1 - Floor plan of option 1)

3.1.1 MAIN CHALLENGE

The main challenge is that the external interfaces for major logistic processes are all concentrated to the north end of the hall. Material will be delivered from the north end meaning all bogies and big parts are introduced to the depot from one side. The main (heavy) crane is also located at the north end of the hall.

The challenge is to develop a concept where all these processes do not interrupt each other.

APPROACH

The approach taken for this option is to move areas which do not require heavy logistics as far to the south as possible whilst keeping the north end of the hall as open as possible to keep open paths to the southern train stands.

3.1.2 NEW BUILDING

To make best use of the no longer required incoming south end of track 762 a lightweight steel frame building will be installed in this area. The new building would accommodate offices, mess room, and sanitary rooms. With this solution it is also ensured that the office building will not block any logistic routes in the main maintenance area.

OFFICES

To save ground floor area it is also possible to use the top of the changing room for additional offices.

MESS ROOM

The layout allows a mess room (30 m²). The mess room will be equipped with kitchen furniture and seating for 20-25 employees.

CHANGING ROOMS / SANITARY

An area of approx. 90 m² can comprise changing rooms, showers and toilets for up to 50 production employees (gender separated).
3.1.3 WORKSHOPS
As modern trains like the Sm5-units do not require extensive mechanical work, a small workshop (approx. 60m²) is sufficient. The workshop will be divided in a smaller electrical area and a slightly bigger mechanical area.

The workshops will be accommodated in a semi-permanent, closed room (modular system).

![Workshop Image]

3.1.4 STORAGE

MAIN STORAGE
Height is limited to 4 m on track 762 due to the overhead crane, 2 storage rack rows with length of 45 m each would contain total front facing rack area of 360 m². The picture below shows a similar solution. To protect the storage area from unauthorized access it will be fenced.

![Storage Image]

SMALL PARTS STORAGE
Other semi-permanent containers (as foreseen workshops) will give storage possibilities for small parts and tools

STORAGE OF DANGEROUS GOODS
Dangerous goods will be stored in dedicated building outside the main depot building.
BOGIE STORAGE
An open area between the main storage and the flexible used area will be used for bogie storage. This location is ideal because it is next to the lifting stand and has direct track access through the flexible used area. Also, it is still in the reach of 12.5 t crane.

No special installations are required in this area. This enables high flexibility: When no bogie exchanges are planned bogies for half to a full trainset may be stored in this area to ensure the availability on short notice. The other bogies shall be stored externally.

During exchange process the storage area can be used as temporary storage area for old and new bogies. As there are no buildings and constructions in this area bogies can easily be lifted between track 762 and 763 as well as over each other.

CAPITAL SPARE PART STORAGE
As the capital spare parts are not planned to be used frequently most capital spare parts will be stored externally and only a small stack should be available in the depot.

3.1.5 FLEXIBLE USED AREA
To keep open routes from the north end of the hall to the southern train stands no constructions will be raised on the complete northern part of track 762 (length approx. 90 m). This area will be dedicated for individual use such as:

- Storage along the depot wall
- Temporary work stations
- Bogie Storage
- Additional stand place
  - This might be forbidden by safety officials since there are offices located on the same track.
- Logistic routes
3.2 **OPTION 2 – ALL FACILITIES INSIDE OF THE OLD SM5 HALL**

All facilities will be located in the old Sm5 hall. (Appendix 2 - Floor plan of option 2)

### 3.2.1 DIFFERENCES TO OPTION 1

In this option, all main requirements to the new structures remain the same as in option 1. The differences are explained in this chapter.

**OFFICES**
The offices are located at the south end of track 762. To allow best use of the given space, and because the 12.5 t crane does not reach into this area, the office building shall be a double story building. For an inside office it is recommended to build it as a semi-permanent modular solution (as the workshop and small part storage of the main proposal).

### MESS ROOMS / CHANGING ROOMS / TOILETS

To include the mess room, changing rooms and toilets to the main depot building they would be located just north of the offices.

**STORAGE AREA**

Compared to option 1 the storage area will move further north on track 762. This will limit the working area of the 12.5 t crane.

**FLEXIBLE USED AREA**

As the offices and sanitary rooms are included in the main building the flexible used area would be reduced to approx. 60 m. Due to that, it is no longer possible to use the northern stand on track 762 to bring in a complete Sm5 unit.

**BOGIE STORAGE**

As there is anyways no possibility to bring in a trainset to the flexible used area, bogies can be stored in that area (now). Another solution would be to disconnect the outside part of track 762 from track 763 and extend the roof of track 762 to the north in order to place the bogie storage outside the main depot shed.

**OPTION OF SWAPPING THE LIFTING STAND AND THE OVERHAUL STAND**

Having the lifting stand in the south (as it is now) and the northern overhaul stand occupied, there is no chance to move a bogie from the lifting stand to the flexible used area or bogie storage, because the fences of the storage area are blocking crane movements. In this way it is only possible to exchange bogies when the overhaul stand is not in use.
When swapping the lifting and overhaul stand bogie handling would be much more convenient during the exchange process. The downside of the swap would be that the overhaul stand will no longer be in the reach of the crane. This means that an overhaul task which requires a crane can no longer be planned on the overhaul stand. Also the adjacent office building would block logistic processes of the overhaul stand.

Considering these facts and to save the additional costs of relocating the lifting jacks it is better to schedule bogie changes for such period when overhaul stand is not occupied.

3.3 OPTION 3 – USE OF THE OLD OFFICE AND LOCKER ROOM FACILITIES
Storage and possibly some workshops/supervisor offices will be located in the old Sm5 hall and other facilities will be located in other parts of depot. (Appendix 3 - Floor plan of option 3)

3.3.1 DIFFERENCES TO OPTION 1 AND 2
In this option existing office and locker rooms will be used. Distance from Sm5 hall to these facilities is longer and some of the facilities might be shared with other companies.

In this option there is one more PM/CM stand than in option 2 (and maybe in option 1) because there is no need to build offices to the south side of track 762. Small supervisor office can probably be located somewhere else.
4 TRAIN CLEANING

4.1 SITUATION
Cleaning is currently done mostly at the four westernmost tracks. Each track allows five Sm5 units to be cleaned at the same time. Cleaning platforms are equipped for whole length with fixed CET stations.

At the moment there are no rooms or buildings next to the cleaning area. The cleaners are also based in the main depot building and have to walk with all their material and tools across the bridge to reach their working place.

4.2 CLEANING TOOLS
Train cleaning does not require any special tools. Standard cleaning equipment such as towels, buckets, brushes, scrapers, brooms, mops, vacuum cleaners (mobile), and window cleaning tools are sufficient.

4.3 UPGRADE POSSIBILITIES
To improve the current situation the following upgrade possibilities shall be considered.

4.3.1 ASSUMPTIONS
To reach a weekly interval 12 trains have to be cleaned by day to cover the whole fleet.

Daily cleaning will be done by mobile teams at the stations.

4.3.2 INFRASTRUCTURE
Minimal requirement to the infrastructure upgrade will be a storage room for cleaning tools and detergents. Good location for these would be next to the cleaning tracks if it is allowed to be built there by city authorities.

Depending on the organisational setup (if there is a strict differentiation between maintenance and cleaning team) changing rooms, sanitary rooms and a mess room may also be installed next to the cleaning tracks.
Requirements:

<table>
<thead>
<tr>
<th>Room</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage room</td>
<td>• Separated for tools and detergents</td>
</tr>
<tr>
<td></td>
<td>• Acid proof floor coating</td>
</tr>
<tr>
<td></td>
<td>• Power and Water supply</td>
</tr>
<tr>
<td></td>
<td>• Small workstation</td>
</tr>
<tr>
<td>Changing rooms</td>
<td>• Gender separated</td>
</tr>
<tr>
<td></td>
<td>• Including showers and toilets</td>
</tr>
<tr>
<td>Mess Room</td>
<td>• Including kitchen furniture</td>
</tr>
</tbody>
</table>

4.4 TRAIN ACCESS

There is level access on the 4 eastern tracks to make it easy for cleaning personnel to get inside the trains.
Appendix 1 - Floor plan of option 1

- Bogie storage for approx. 5 bogies
- Storage: Palette racks (270 m²) Approx. 3,5 m gangway
- Storage: small parts / tools (60m²)
- Workshop E&M (60m²)
- Offices (90 – 180 m²)
- Mess room with little kitchen (30 m²)
- Changing rooms / showers for X person
- Toilets
• Spare bogies are stored outside on track 762

• Storage: Palette racks (270 m²)
  Approx. 3.5 m gangway

• Storage: small parts / tools (60m²)

• Workshop E&M (60m²)

• Offices (90 – 180 m²)
• Mess room with little kitchen (30 m²)
• Changing rooms / showers for X person
• Toilets
Appendix 3 - Floor plan of option 3

- Preventive/Corrective Stand 1
- Preventive/Corrective Stand 2
- Preventive/Corrective Stand 3
- Preventive/Corrective Stand 4
- Lifting Stand 1
- Overhaul Stand
- Flexible used area

- Offices (90 – 180 m²)
- Mess room with little kitchen (30 m²)
- Storage: small parts / tools (60 m²)
- Workshop E&M (60 m²)
- Storage: Palette racks (270 m²)
- Approx. 3.5 m ganway
- 5 bogle storage for approx.

About 80 meters

Facilities from old part of depot