Annex B

The Services - Scope of Works

For the design of Haifa – Nazareth Tram-Train Project
Content

1. Introduction and General Description of the Project ............................................. 4
  1.1. Introduction ........................................................................................................... 4
  1.2. High-level Background and Description ............................................................. 4
  1.3. The Haifa Metropolitan Area .............................................................................. 5
  1.4. Main Roads and Road Projects .......................................................................... 6
  1.5. Public Transport Network .................................................................................... 7
  1.6. Population ............................................................................................................ 8
  1.7. Present Trip Patterns ........................................................................................... 8
  1.8. Forecast Transport Demand ............................................................................... 10
  1.9. The Alignment of the Planned LRT ................................................................... 12
  1.10. Stations and Stops ............................................................................................. 14
  1.11. Road 781 .......................................................................................................... 17

2. Scope of Services ..................................................................................................... 17
  2.1. General .............................................................................................................. 17
  2.2. Design Services Generally ................................................................................. 17
  2.3. Road 781 ........................................................................................................... 20
  2.4. Ancillary, Complimentary and Other Services .................................................... 21
  2.5. Independent Safety Assessor (ISA) .................................................................... 22

3. Preliminary Design and Final Design .................................................................... 22
  3.1. General: Design Standards and Criteria .............................................................. 22
  3.2. Utilities Coordination and Relocation ................................................................. 23
  3.3. Track Alignment .................................................................................................. 25
  3.4. Civil Engineering Works ..................................................................................... 27
  3.5. Traffic Arrangement and Impact Plan ................................................................. 32
  3.6. Rail Systems ....................................................................................................... 34
  3.7. Rolling Stock ...................................................................................................... 37
  3.8. OCC and Depot Site ........................................................................................... 38
  3.9. Operating Principles ........................................................................................... 40
  3.10. Project Preliminary Report ............................................................................... 41
  3.11. Schedule of Works .......................................................................................... 43
  3.12. Investment Cost Estimate .................................................................................. 44
  3.13. Executive Summary Report .............................................................................. 44

4. Detailed Design of Civil Works .............................................................................. 45
  4.1. Input Data and Output Documentation ............................................................... 45
  4.2. Detailed Design .................................................................................................. 46
  4.3. Construction Works, Building Permits and Cost Estimates ............................... 54

5. Technical Engineering Documents for Infra 2 Tender .......................................... 58
  5.1. General .............................................................................................................. 58
  5.2. Design for Infra 2 Tender .................................................................................. 58
  5.3. Tender Process ................................................................................................... 65
  5.4. Proposals Submission and Evaluation ............................................................... 65
  5.5. Award of Contract ............................................................................................. 65

6. Supreme Supervision for Infra 1 Works .................................................................. 65
  6.1. General .............................................................................................................. 65
  6.2. Purpose .............................................................................................................. 65
  6.3. Construction Site Supervision Milestones .......................................................... 66

7. Supreme Supervision for Civil Work of Infra 2 Works ......................................... 68

8. Combined Service Drawings ................................................................................. 68
9. Design Management Process ........................................................................................................ 69
    9.1. Design Management Plan .................................................................................................... 69
    9.2. General Design Requirements ............................................................................................. 70
    9.3. Project Reviews and Reporting ........................................................................................... 74
    9.4. Designer’s Design Package Submission Process .................................................................... 77
    9.5. The Company’s Review ........................................................................................................ 87
    9.6. Content of Deliverables ....................................................................................................... 89
    9.7. The Company’s CAD Guidelines ........................................................................................ 90
    9.8. The Company’s Reference Design ...................................................................................... 90
1. **Introduction and General Description of the Project**

1.1. **Introduction**

1.1.1. On August 11th, 2016, the Government of Israel issued Government Resolution No. 1838, a multi-year investment plan for the development of public transportation in metropolitan areas, including the development of a mass transportation system in the Haifa metropolitan area. Clause 3 of the said decision instructed the Ministry of Transport and Road Safety (the “MoT”) to promote the construction and operation of a light rail transit (LRT) line in the Haifa metropolitan area, between Haifa and Nazareth, as described in more detail below (the "Project").

1.1.2. Cross Israel Highway Ltd. (the "Company") is a government-owned company entrusted with advancing the design and implementation of the mass transportation system project in the Haifa metropolitan area.

1.1.3. The planned route of the Project will consist of two (2) main sections: an interurban section and an urban section.

1.1.4. The interurban section will start at the Haifa Bay Center, run through Kiryat Ata, Shfar'am and Bir el Maksur, continue along Route 79 to the Reina intersection and end at the entrance to Nazareth Illit.

1.1.5. The planned length of the interurban section is approximately 34 kilometers and will include eleven (11) stops.

1.1.6. The planned urban section is about 7 kilometers long, will pass through the streets of the towns of Nazareth and Nazareth Illit and will include eight (8) stops.

1.1.7. The overall planned route was approved as part of National Infrastructure Plan No. 56. A certain segment of the route, north-east of Kiryat Ata, is still under discussion and will be approved as part of Preferred Housing Plan ("ת"מ") No. 1025.

1.1.8. Preferred Housing Plan No. 1025 also includes a segment of Road 781, between Road 22 and Road 79. This segment is included in this Scope of Works.

1.2. **High-level Background and Description**

1.2.1. The purpose of sections 1.3 to 1.11 below is to provide a high-level background and description of the Project in general and of the planned LRT line. It is an extract from the Preliminary Design Report of March 2015 (original in Hebrew), which is part of the Reference Documents attached to the Invitation to Bid.
1.2.2. The data and information provided in sections 1.3 to 1.11 below are indicative and for general background only. The data and information provided in sections 1.3 to 1.11 below are neither intended nor shall be construed as limiting or derogating from the Scope of Works specified herein, or as limiting or derogating from the Designer’s responsibilities and obligations under and pursuant to the Project Designer Agreement.

1.3. **The Haifa Metropolitan Area**

1.3.1. Haifa is the main economic center and largest city in the north of Israel. The population of Haifa is over 265,000, with an additional approximately 235,000 in the “Krayot” area (Kiryat Bialik, Kiryat Ata, Kiryat Yam, Kiryat Motzkin and Kiryat Haim), making it a metropolitan of over 500,000 people.

1.3.2. Its economic attractiveness is widespread, with many commuters travelling from 30 to 40 kilometers away to work in Haifa. The main populated areas around Haifa are:

1.3.2.1. The Nazareth area, located about 30 kilometers south-east of Haifa, with a population of about 170,000;

1.3.2.2. The Karmiel area, located about 30 kilometers north-east of Haifa, with a population of about 110,000;

1.3.2.3. The Shefa’am area, located about 20 kilometers east of Haifa, with a population of about 100,000; and

1.3.2.4. The Akko (Acre) – Judeida Maker area, located about 20 kilometers north of Haifa, with a population of about 65,000.
1.4. Main Roads and Road Projects

1.4.1. Those areas are connected by a road network, of which the main routes are:

1.4.1.1. Road 4 between Haifa, Krayot and Akko;
1.4.1.2. Road 75 between Haifa and Nazareth;
1.4.1.3. Road 85 between Akko and Karmiel;
1.4.1.4. Road 79 between Krayot and Nazareth; and
1.4.1.5. Road 70 linking Roads 75, 79 and 85 through the Shefara’am area.

1.4.2. The main road developments related to the Project are (according to the present designs):

1.4.2.1. The widening of Road 85, with the intersections being changed into grade-separated interchanges;
1.4.2.2. The widening of Road 79 and its connection to the planned LRT line, with the intersections also being changed into grade-separated interchanges; and
1.4.2.3. The extension of Road 6 and consequential changes to Road 70.
1.5. **Public Transport Network**

1.5.1. The public transport network in the Haifa metropolitan area and surrounding areas is generally comprised of:

1.5.1.1. The Israel Railways north-south line, which connects Haifa, Krayot and Akko to certain cities and towns in the north, center and south of the country; and a new Israel Railways lines from the existing line south of Akko to Karmiel and connecting Haifa, Afula and Bet Shean (not shown on the map below);

1.5.1.2. The National Infrastructure Plan No. 65 Shore Line Rail connecting to the Lev Hamifraz transportation hub (and which may impact on the planned LRT line);

1.5.1.3. Intercity bus lines connecting the different urban areas (from Nazareth, the intercity buses to Haifa use Road 75); and

1.5.1.4. Urban bus lines in the main cities and towns, including the Bus Rapid Transit (BRT, Matronit) network in Haifa and Krayot, which is currently under development.

*Figure 2 Main road projects*

*Figure 3 Israeli Railways network projects*
1.6. Population

1.6.1. The map below depicts the population of the Haifa metropolitan area and its surroundings as at 31 December 2008.

Figure 4 Population 31/12/2008

1.6.2. The population in the Haifa metropolitan area and surrounding areas is growing rapidly and is expected to double by 2040. The forecasts for 2040 are a population of about 2 million: About 1 million in the Haifa – Krayot area and about 1 million in the surrounding areas (“ring”).

1.7. Present Trip Patterns

1.7.1. The tables below indicate the number of daily trips for all modes of transport (including walking) according to a 2008 survey of the Haifa metropolitan area and its surroundings.

1.7.2. The map below the tables summarizes the 2008 daily trip patterns. As appears therefrom, the main transit corridors are between Haifa and the Karmiel area and between Haifa and the Nazareth area.
<table>
<thead>
<tr>
<th>ALL MODES</th>
<th>Haifa area</th>
<th>Shfaram area</th>
<th>Nazareth area</th>
<th>Karmiel area</th>
<th>Akko</th>
<th>Other areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haifa area</td>
<td>11 739</td>
<td>12 258</td>
<td>14 274</td>
<td>13 264</td>
<td>47 588</td>
<td></td>
</tr>
<tr>
<td>Shfaram area</td>
<td>11 500</td>
<td>4 197</td>
<td>1 146</td>
<td>1 294</td>
<td>2 898</td>
<td></td>
</tr>
<tr>
<td>Nazareth area</td>
<td>11 527</td>
<td>3 227</td>
<td>284 596</td>
<td>1 310</td>
<td>4 095</td>
<td>32 416</td>
</tr>
<tr>
<td>Karmiel area</td>
<td>14 526</td>
<td>1 504</td>
<td>1 777</td>
<td>221 190</td>
<td>6 412</td>
<td>13 015</td>
</tr>
<tr>
<td>Akko</td>
<td>16 331</td>
<td>1 311</td>
<td>4 129</td>
<td>6 693</td>
<td>184 855</td>
<td>20 873</td>
</tr>
<tr>
<td>Other areas</td>
<td>45 052</td>
<td>2 070</td>
<td>32 805</td>
<td>13 072</td>
<td>24 009</td>
<td>266 937</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRANSIT</th>
<th>Haifa area</th>
<th>Shfaram area</th>
<th>Nazareth area</th>
<th>Karmiel area</th>
<th>Akko</th>
<th>Other areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haifa area</td>
<td>2 833</td>
<td>3 898</td>
<td>4 510</td>
<td>10 891</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shfaram area</td>
<td>1 413</td>
<td>111</td>
<td>16</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nazareth area</td>
<td>5 751</td>
<td>238</td>
<td>76 121</td>
<td>397</td>
<td>10 639</td>
<td></td>
</tr>
<tr>
<td>Karmiel area</td>
<td>3 613</td>
<td>469</td>
<td>659</td>
<td>888</td>
<td>5 033</td>
<td></td>
</tr>
<tr>
<td>Akko</td>
<td>2 401</td>
<td>0</td>
<td>297</td>
<td>18 367</td>
<td>4 929</td>
<td></td>
</tr>
<tr>
<td>Other areas</td>
<td>9 683</td>
<td>50</td>
<td>10 135</td>
<td>5 249</td>
<td>57 795</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% TRANSIT</th>
<th>Haifa area</th>
<th>Shfaram area</th>
<th>Nazareth area</th>
<th>Karmiel area</th>
<th>Akko</th>
<th>Other areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haifa area</td>
<td>23%</td>
<td>27%</td>
<td>34%</td>
<td>23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shfaram area</td>
<td></td>
<td>34%</td>
<td>10%</td>
<td>1%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Nazareth area</td>
<td>50%</td>
<td>7%</td>
<td>27%</td>
<td>61%</td>
<td>10%</td>
<td>33%</td>
</tr>
<tr>
<td>Karmiel area</td>
<td>25%</td>
<td>31%</td>
<td>37%</td>
<td>34%</td>
<td>14%</td>
<td>39%</td>
</tr>
<tr>
<td>Akko</td>
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<td>0%</td>
<td>7%</td>
<td>6%</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>Other areas</td>
<td>21%</td>
<td>2%</td>
<td>31%</td>
<td>29%</td>
<td>22%</td>
<td>22%</td>
</tr>
</tbody>
</table>
1.8. **Forecast Transport Demand**

1.8.1. AB Plan’s traffic model was used to assess the potential public transport ridership on the Haifa – Nazareth corridor for the year 2030.

1.8.2. The potential public transport ridership between Bar Lev and Lev Hamifratz was assessed on the basis of 2025 traffic forecasts, estimated by Yefe Nof in 2009 for a Haifa – Karmiel LRT line. The Bar Lev – Lev Hamifratz traffic forecasts presented below were performed on the assumption that the following traffic forecasts will remain unchanged from the forecasts performed in 2009:

1.8.2.1. Trips from Karmiel, El Shagor and Gilon to beyond Yavor (with a transfer at Bar Lev)

1.8.2.2. Trips between Bar Lev and Lev Hamifratz.

---

1 Except the trips from Karmiel to Lev Hamifratz, which are considered to be made by train.
Figure 6 Forecasted trips by public transport, AM peak 2030, towards Haifa (AB Plan and Yefe Nof models results)

Figure 7 Forecasted trips by public transport, AM peak 2030, Haifa-Nazareth direction (AB Plan model results)
1.8.3. The probable ridership is about three thousand eight hundred (3,800) passengers per hour reaching Lev Hamifratz during morning peak hours, from each branch linking to Haifa (PPHPD): About nine hundred (900) leaving the Nazareth area, in the direction of Haifa and increasing to about one thousand six hundred (1,600) when reaching Gilam (the junction point of the two (2) branches linking to Haifa). The figures are almost the same on the Bar Lev branch, with about seven (700) leaving Bar Lev and about one thousand eight hundred (1,800) reaching Gilam.

1.9. **The Alignment of the Planned LRT**

1.9.1. The proposed LRT line will be a combination of trains traveling in the interurban areas at speeds of up to 100 km/h, with (mostly) segregated right of way with train signaling and trams traveling in the urban areas at speeds of up to 50 km/h, with partially segregated right of way and crossing junctions at-grade with combined traffic lights for the LRT and motor vehicle traffic. This dual mode characteristic is the reason the Project is described as a “Tram-Train” project.

1.9.2. The proposed LRT alignment stretches from the Lev Hamifratz transportation hub in Haifa, with an intermodal station inter-connecting the Israel Railways station, the bus depot and the LRT station and with close links to Road 75 to the east, the Road 25 intercity tunnel and Roads 4 and 22 to the north.

1.9.3. The proposed LRT alignment follows Road 22 from the east and exits to the east at Ata North Interchange to the median of Road 781, with the proposed LRT depot and OCC facilities situated south of Ata South Interchange. Further details concerning Road 781 may be obtained from Preferred Housing Plan No. 1025, which is available at the following website: [http://mavat.moin.gov.il/MavatPS/Forms/SV3.aspx?tid=3](http://mavat.moin.gov.il/MavatPS/Forms/SV3.aspx?tid=3)

1.9.4. The proposed alignment passes through Gilam Interchange (Roads 79/781) and travels to the median of Road 79, with grade separation with all road crossings until Reina intersection, which marks the end of the interurban section.

1.9.5. The proposed alignment continues into the Har Yona Industrial Zone at the entrance to Nazareth Illit, then to Nazareth through Maale Yitzhak St. and to Government City, ending at Taufik Zayed intersection.

1.9.6. The entire length of the proposed line is about 41 kilometers, with eleven (11) stops in the interurban section and eight (8) stops in the urban section (of Nazareth).

1.9.7. All stations are at-grade, are generally to be referred to as stops and will have platform ramps covered with canopies, except for the Government City station, as it is planned to include a station building.
Figure 8 Map of the proposed LRT line

Figure 9 Proposed LRT line and stations
1.10. **Stations and Stops**

**Main Types**

1.10.1. The LRT stops are classified as two (2) main types:

1.10.1.1. Stops located mostly in the interurban section, usually fully segregated and with grade separation of LRT traffic from motor vehicle traffic. As train speeds are high along this section, crossing of passengers between platforms should be limited. Arrival and departure from platforms will be by stairs, escalators and elevators (as required). Some stops will allow transfer to other modes of transportation, mostly bus services and parking facilities, for day parking or “kiss & ride”.

1.10.1.2. Stops located mostly in the urban section, usually with platforms as elevated curbs on the side or in the median and passengers traveling in and out of the stop via walkways and signalized street crossings. The stop should match the street scape, have clear and simple features and not clutter already busy streets.

1.10.1.3. Special attention should be paid to the following stops:

1.10.1.3.1. Terminal stations, which will include additional tracks for shunting and stabling; and

1.10.1.3.2. The Government City station in Nazareth, as mentioned above.

**Proposed Characteristics of Stations and Stops**

1.10.2. All stops will be at-grade, open platform, unmanned operation. The platform furniture will include, *inter alia*, canopies, benches, bins, lighting poles and security elements as CCTV.

1.10.3. The stops will have no ancillary facilities, except for provisions for vending machines and/or water points.

1.10.4. All stops will be accessible for disabled persons.

1.10.5. The canopies will shelter passengers against climate conditions during boarding and alighting from trains and will cover at least two-thirds of the platform length.

1.10.6. Passenger services will include ticketing machines and validators (AFC) and passengers information systems (audio and message boards, maps, schedules, fares, clocks and the like).
1.10.7. Platforms will be sixty-five (65) meters long in interurban areas and fifty (50) meters long in urban areas. Side platforms will be at least four (4) meters wide and island platforms will be at least eight (8) meters wide. Platform heights will be at thirty-five (35) centimeters above track level.

1.10.8. The maximum gradient of stops (above tracks) will be four percent (4%) - platforms up to five percent (5%) on profile with side slopes of up to one percent (1%).

1.10.9. Clear headroom for all stop elements will be at least two and a half (2.5) meters.

Parking Facilities

1.10.10. Along the line and adjacent to each stop a parking facility will be arranged, either dedicated as part of the stop perimeter or based on existing parking lots.

1.10.11. Where needed, a grade separated connection or safe crossing will be built.

1.10.12. The parking facilities may be built in stages, according to planned usage.

1.10.13. The following table summarizes the parking facility suggestions for the year 2040 according to National Infrastructure Plan No. 56:

<table>
<thead>
<tr>
<th>Station</th>
<th>Passengers Boarding (peak AM)</th>
<th>Proposed parking places</th>
<th>Proposed at-grade parking</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lev Hamifratz</td>
<td>1240</td>
<td>400</td>
<td>300</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
<tr>
<td>Ata Darom</td>
<td>435</td>
<td></td>
<td></td>
<td>Existing Parking</td>
</tr>
<tr>
<td>Q. Ata Center</td>
<td>700</td>
<td>260</td>
<td>390</td>
<td>Parking to be part of future transportation hub</td>
</tr>
<tr>
<td>Tal</td>
<td>665</td>
<td>260</td>
<td>390</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
<tr>
<td>Yiftahel</td>
<td>515</td>
<td>410</td>
<td>880</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
<tr>
<td>Nazareth North</td>
<td>435</td>
<td>350</td>
<td>160</td>
<td>Existing Parking</td>
</tr>
<tr>
<td>Reina</td>
<td>835</td>
<td>670</td>
<td>420</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
<tr>
<td>Har Yona</td>
<td>660</td>
<td>530</td>
<td>455</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
<tr>
<td>Alon</td>
<td>240</td>
<td></td>
<td></td>
<td>Existing parking (cemetery)</td>
</tr>
<tr>
<td>Station</td>
<td>Passengers Boarding (peak AM)</td>
<td>Proposed parking places</td>
<td>Proposed at-grade parking</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------</td>
<td>---------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Government City</td>
<td>335</td>
<td></td>
<td></td>
<td>Existing parking</td>
</tr>
<tr>
<td>HaShuk (Market Sq.)</td>
<td>170</td>
<td>135</td>
<td>127</td>
<td>Existing parking; Provisions for 2nd level</td>
</tr>
</tbody>
</table>

1.10.14. The Designer will, as part of the Scope of Works, recommend the staging of development of the parking facilities with respect to years 2030 and 2040.

Stations

1.10.15. The following is a short description of the stops with additional or special characteristics, which will be referred to as stations in order to distinguish them from the other stops.

**Lev HaMifratz**

1.10.16. The south terminal in Haifa, Lev HaMifratz, will be located in the transportation hub of the Haifa Bay area, close to the business district. There, the LRT line will link with Israel Railways (Shore Lines, HaEmek line), the bus depot, the planned BRT route (Matronit) and a future cable car service to Haifa University. The hub is also accessed by several major roads (Rocks 4, 22, 75 and HaCarmel Tunnels).

1.10.17. The station is considered interurban, will have two (2) side platforms and pedestrian footbridges will connect to the other transportation modes. Parking facilities will supplied at the hub by way of existing and future parking lots.

1.10.18. The station will have four (4) stabling and shunting tracks south of the stop platforms.

1.10.19. Estimated boarding during morning peak hours is estimated at about one thousand two hundred and forty (1,240) passengers by the year 2040.

1.10.20. Most passengers are expected to transfer from other public transport systems, with only about fourteen percent (14%) arriving with private vehicles.

**Government City, Nazareth**

1.10.21. The station will serve the Government offices, Courts of Law, Nazareth Municipality and an adjacent shopping mall.
1.10.22. The station will be located along Maale Yitzhak Street, with grade separation as the platforms will be situated below street level and accessed via escalators and elevators. A footbridge will connect from street level to Government City plaza. The station will not have a parking facility, as there are several public and commercial parking lots in the vicinity of the station.

**Zayad Station**

1.10.23. The terminal station in Nazareth, Zayad Station, will be located at the intersection of Maale Yitzhak Street and Road 75.

1.10.24. The station will have added side tracks for stabling and shunting, as well as terminal facilities (drivers' room, technical rooms, etc). The station will not have a dedicated parking facility, as there are parking lots nearby, in particular the City Hall parking garage.

1.11. **Road 781**

1.11.1. Road 781 begins in the west, in Qiryat Ata, at Hamakim Street and runs westward until it reaches Road 79.

1.11.2. The road will be realigned and upgraded to an urban arterial road, with dual carriageways and signalized intersections. The section of the road to be realigned and upgraded is from Road 22 at Ata North Interchange to Road 79, including Gilam Interchange. The length of the section is about 4.5 kilometers of the main road.

2. **Scope of Services**

2.1. **General**

2.1.1. According to Government Resolution No. 1838, the procurement strategy for the Haifa-Nazareth LRT was set as follows:

2.1.1.1. Stage 1 works (Infra 1 Works) – includes preliminary and detailed design, civil engineering and ancillary works, land acquisition and expropriation, utilities coordination and relocation and all related works; and

2.1.1.2. Stage 2 works (Infra 2 Works) – includes all works not included under Infra 1 Works, including installation of LRT systems, construction of tracks, procurement of rolling stock and commercial operation and maintenance of the LRT line; and

2.1.1.3. Stage 1 works will be carried out with public sector funding in a series of construction only tenders. Stage 2 works will be awarded through a PPP tender to a concessionaire.

2.1.2. In accordance with the above, the Scope of Works for the Designer shall be as set out herein below.
2.2. **Design Services Generally**

2.2.1. The Designer shall undertake Preliminary Design and Final Design for all LRT works (both Infra 1 Works and Infra 2 Works, but excluding the Yiftah-El Interchange), including in respect of but not limited to:

2.2.1.1. Civil engineering and ancillary works;

2.2.1.2. Traffic arrangements and traffic impact plans;

2.2.1.3. Track alignment;

2.2.1.4. Rail systems;

2.2.1.5. OCC and depot site and facilities; and

2.2.1.6. Rolling stock.

2.2.2. In respect of the Infra 1 Works civil engineering and ancillary works, the Designer shall undertake all design and design-implementation activities, including but not limited to:

2.2.2.1. Designing all civil engineering works, roads, streets and sidewalks, traffic arrangements, site development, bridges, tunnels and miscellaneous structures, utilities coordination and relocation, mechanical, electrical and plumbing (MEP) works, parking facilities and OCC and depot site preparatory works;

2.2.2.2. Obtaining all approvals, consents and permits;

2.2.2.3. Preparing tenders for the execution (by way of several construction packages) of the Infra 1 Works in accordance with the above design;

2.2.2.4. Preparing construction documents and performing supreme supervision of the execution of the Infra 1 Works; and

2.2.2.5. Approving execution of the Infra 1 Works and preparing completion certificates.

2.2.3. In respect of the Infra 2 Works, the Designer shall undertake all design and design-implementation activities for the PPP tender, including for and in respect of but not limited to the following systems, facilities and activities:

2.2.3.1. Trackway and track works and systems;

2.2.3.2. Power supply systems and substations;

2.2.3.3. Overhead contact systems;

2.2.3.4. Train signaling;
2.2.3.5. Traffic signaling (including traffic priority systems);
2.2.3.6. EMI;
2.2.3.7. Train control and SCADA;
2.2.3.8. Radio and communications;
2.2.3.9. Operations Control Center (OCC);
2.2.3.10. Maintenance and stabling yard (Depot) equipment;
2.2.3.11. Rolling stock (including simulator);
2.2.3.12. Operation and maintenance planning and specifications;
2.2.3.13. RAMS parameters;
2.2.3.14. LRT system security, including security control systems;
2.2.3.15. Automatic fare collection;
2.2.3.16. Passenger and customer services (PIS, PA);
2.2.3.17. Civil engineering works and road and roadside development;
2.2.3.18. CCTV;
2.2.3.19. Telephone emergency system;
2.2.3.20. Backbone transmission network;
2.2.3.21. Tunnel MEP;
2.2.3.22. Access control system;
2.2.3.23. Depot management system;
2.2.3.24. Safety specifications;
2.2.3.25. Obtaining all approvals, consents and permits required for tender stage;
2.2.3.26. Preparing the PPP tender for the execution of the Infra 2 Works in accordance with the above design;
2.2.3.27. Preparing construction documents and performing supreme supervision of the execution of the Infra 2 Works; and
2.2.3.28. Approving execution of the Infra 2 Works and preparing completion certificates.
2.2.4. The PPP tender for the Infra 2 Works will include:

2.2.4.1. All railway systems at Final Design level; and
2.2.4.2. All civil engineering works at Detailed Design level, including in respect of those aspects of the Project that will be executed by the Infra 1 Works contractors (such as, but without limitation, bases and poles for the overhead contact systems).

2.3. **Road 781**

2.3.1. The Designer shall undertake Preliminary Design and Final Design of the entire Road 781.

2.3.2. In respect of the segment of Road 781 from and including the connection to Road 22 and until Road 79, but excluding the Gilam Interchange, the Designer shall also undertake the Detailed Design of Road 781.

2.3.3. The design and design-implementation activities for Road 781 will (as part of the Infra 1 Works) include, but not be limited to:

2.3.3.1. Highway and road design (geometry, pavements, drainage, etc.);
2.3.3.2. LRT alignment design within the Road 781 limit of work (LOW) boundary;
2.3.3.3. Traffic arrangements design and coordination (including provision of traffic lights);
2.3.3.4. Lighting and traffic management systems design;
2.3.3.5. MEP design;
2.3.3.6. Identifying considerations for future implementation;
2.3.3.7. Utilities and services design and coordination;
2.3.3.8. Preparing tenders for the execution of the above design;
2.3.3.9. Preparing construction documents and performing supreme supervision of the execution of the works;
2.3.3.10. Approving execution of the works and preparing completion certificates.

2.3.4. Appendix B hereto contains drawing no. CIH-HW-LRTHN-781-LOW-SD-0101-00, with a map of the planned Road 781 according to Preferred Housing Plan No. 1025 and marked with the limit of works boundary for Road 781.
2.3.5. The Road 781 works shall be designed according to the requirements and specifications of Netivei Israel and may be subject to its approval.

2.3.6. Depending on the requirements of the MoT and Qiryat Ata, it may be necessary to construct parts of Road 781 ahead of the currently anticipated construction schedule. Therefore, the Company may instruct the Designer to complete the design and perform its design-implementation responsibilities in respect of Road 781 ahead of the currently anticipated schedule.

2.4. **Ancillary, Complimentary and Other Services**

2.4.1. The Designer shall be responsible to review and assist the Company with answering external and interfacing parties' enquiries and requests in relation to the design and implementation of the Project.

2.4.2. The Designer shall be responsible to review the design of utilities submitted by the utilities bodies/authorities for approval, to review the as-built drawings of utilities and to integrate the information into the design of the Project.

2.4.3. The Project shall be designed and implemented within the boundaries and according to the terms and requirements of National Infrastructure Plan No. 56 and Preferred Housing Plan No. 1025. The Designer shall be responsible to perform all services and tasks which are necessary or required to ensure that the Designer's design and implementation of the Project is fully and properly compliant National Infrastructure Plan No. 56 and Preferred Housing Plan No. 1025.

2.4.4. The Designer shall take into consideration and account and make appropriate provisions in its designs for possible extensions of the LRT line to the south and to Nazareth Illit (although the design of the extensions themselves is not part of this Scope of Works).

2.4.5. The Designer shall be responsible to undertake all of the following:

   2.4.5.1. All surveys required for the preparation of its design, including but not limited to topographic surveys, geological and geotechnical studies, etc.;

   2.4.5.2. Detection of utilities, including by means of underground locators such as radar or electromagnetic scans and/or field pits, all as approved by the Company;

   2.4.5.3. Review of existing bridges and structures within or which may be impacted by the proposed LRT alignment;

   2.4.5.4. Design of priority traffic lights at applicable intersections and junctions;
2.4.5.5. Obtaining all approvals, permits and consents required for the approval of its designs by the Company and by all applicable authorities;

2.4.5.6. Obtaining all applicable building permits; and

2.4.5.7. Preparation of all tender packages.

2.4.6. The above-described design services shall include all aspects and the entire area of all byroads and agricultural trails, regardless of whether any part of any one or more thereof is situated within or outside the borders of National Infrastructure Plan No. 56, Preferred Housing Plan No. 1025 and/or the Road 781 limit of work (LOW).

2.4.7. In respect of stations and stops, the above-described design services shall include all structures, bridges, footbridges, escalators, elevators, underpasses and landscaping.

2.4.8. In respect of urban areas, the above-described design services is from façade to façade, including all connections to parking lots, paths, walkways, etc.

2.4.9. In respect of intersections and junctions, the above-described design services include all aspects and the entire area of all crossing-roads, regardless of whether any part of any one or more crossing-road is situated within or outside the borders of National Infrastructure Plan No. 56, Preferred Housing Plan No. 1025 and/or the Road 781 limit of work (LOW).

2.5. **Independent Safety Assessor (ISA)**

2.5.1. The Company will engage an Independent Safety Assessor (ISA) as required by all applicable laws and regulations.

2.5.2. The Designer will liaise and coordinate with the ISA and submit for the ISA’s approval its Preliminary, Final and Detailed Designs (as applicable) of all design package.

2.5.3. The ISA will issue a report with recommendations and instructions to amend the applicable design or a notice of approval. The Designer shall amend the applicable design(s) according to the instructions issued by the ISA.

3. **Preliminary Design and Final Design**

3.1. **General: Design Standards and Criteria**

3.1.1. As an integral part of the preparation of its designs, the Designer shall:

3.1.1.1. Assess reference designs, design criteria and design standards;

3.1.1.2. Undertake all required studies, surveys and analyses; and
3.1.1.3. Undertake utilities assessment and coordination.

3.1.2. Prior to commencement of the preparation of its designs, the Project Designer shall define the set of Design Standards and Criteria which are intended to be used. These must be internationally recognized and shall be subject to approval by the Company.

3.1.3. The Design Standards and Criteria shall cover track and road alignment, traffic management, critical dimensions, minimum vertical and lateral clearances, finishes, equipment characteristics, furnishings, fire resistance and safety issues generally, as well as any special design features.

3.1.4. The Project Designer shall document these Design Standards and Criteria in a report describing each standard/criterion and its application, including drawings, sketches, schematics and tables, as required, illustrating the relevant Design Standards and Criteria.

3.1.5. The report shall take into account and include reference to the type of LRT vehicle, commercial speeds, the operation scheme, traffic counts, passenger forecasts (modelling) and any and all other relevant information and considerations.

3.2. **Utilities Coordination and Relocation**

**Purpose and requirement:**

3.2.1. The Project Designer shall identify the public and private utilities networks affected by the implementation of the Project, determine the needs for relocation and propose relocation arrangements, all in agreement with the relevant utilities bodies and/or authorities. The utilities concerned include, but are not limited to:

3.2.1.1. Water networks (drinking and/or raw water supply and distribution, including specific fire-fighting water, sewage and storm water drainage);

3.2.1.2. Electrical networks (supreme, high, medium, or low voltage) and lightning networks;

3.2.1.3. Telecommunication and television cable networks;

3.2.1.4. Gas distribution networks; and

3.2.1.5. Tashan and Kazza oil pipes.

**Task description:**

3.2.2. The Designer shall:
3.2.2.1. Collect from the utilities bodies/authorities all relevant data on their existing and projected networks and carry out a preliminary survey for evaluation of accuracy;

3.2.2.2. Determine, in agreement with the utilities bodies/authorities, the segments of utility networks to be relocated due to the Project design, or due to future Project maintenance and/or upgrade considerations;

3.2.2.3. Propose and design when needed relocation arrangements for the relevant segments of utility networks, including (if necessary for the Project) outside of the boundary of National Infrastructure Plan No. 56;

3.2.2.4. Prepare coordination drawings displaying all existing and maintained, relocated, planned and cancelled utility networks on top of the Project plans, fully coordinated both horizontally and vertically; and

3.2.2.5. Obtain the approval by each of the utilities bodies/authorities of the resulting relocation arrangements.

**Deliverables:**

3.2.3. The Designer’s deliverables shall include:

3.2.3.1. The minutes of the Designer’s meetings with the utilities bodies/authorities;

3.2.3.2. A design summary report with the description of the utilities networks and the major Project-related issues in connection therewith, the proposed solutions, the decisions taken and the proposed construction methodology and phasing;

3.2.3.3. Utilities coordination drawings (in color), the background being the general Project site plans showing the LRT and roads alignment etc., including:

   3.2.3.3.1. Existing and currently planned utilities, generally at a scale of 1:1000, or 1:500 where needed;

   3.2.3.3.2. Relocated utilities, generally at a scale of 1:1000, or 1:500 where needed; and

   3.2.3.3.3. Cross-sections and details at appropriate scale, at significant locations, all as approved by the Company;

3.2.3.4. The approval by each of the utilities bodies/authorities, appropriately documented by the Designer in the above drawings and report; and
3.2.3.5. Obtaining the bill from the utilities bodies/authorities to be paid by the Company.

3.3. **Track Alignment**

**Urban planning of the LRT alignment:**

3.3.1. The Designer shall:

3.3.1.1. Gather and map data on the different urban environments encountered along the proposed LRT alignment;

3.3.1.2. Assess the urban environment, according to the characteristics of each area along the proposed LRT alignment and assess the statutory and strategic plans applicable to the area of the LRT alignment and its immediate surroundings;

3.3.1.3. Propose improvements and/or renovations where deemed desirable for purposes of the Project;

3.3.1.4. Identify access to properties along the proposed LRT alignment (by pedestrians and vehicles), for purposes of their possible use or integration in the Project, such as for parking facilities, loading and unloading areas, rescue and emergency operations, etc.;

3.3.1.5. Study pedestrian safety issues, such as access to and from the LRT stops and stations and crossing of the LRT alignment;

3.3.1.6. Consider the accessibility requirements according to all applicable laws and regulations and MoT Guidelines; and

3.3.1.7. Study inter-modal transfer issues, such as passenger movements between LRT stops and stations and other interconnecting modes of transportation.

**Urban design (façade-to-façade) of the LRT alignment:**

3.3.2. The Designer shall:

3.3.2.1. Propose principles of LRT urban insertion, including land use principles along the proposed LRT alignment and including the layout of cycle paths;

3.3.2.2. Define layouts of “park & ride” facilities;
3.3.2.3. Define materials and finishes, including track bed, road and pavement materials;

3.3.2.4. Establish the street lighting principles;

3.3.2.5. Propose locations for new public spaces (squares, etc.) and artworks (if need be);

3.3.2.6. Define the necessary urban furniture (benches, bins, pillars, etc.); and

3.3.2.7. Determine and incorporate any safety and security features (e.g. civil defense, accessibility requirements, etc.).

Architectural design:

3.3.3. The Designer shall:

3.3.3.1. Design the LRT stops and stations, typical and special (if any), including the canopies and all other ancillary and related facilities and equipment;

3.3.3.2. Design the power substations, typical and special (if any) and all buildings and related structures necessary for the Project’s proper functioning and operation (including all necessary building services); and

3.3.3.3. Design all structural works (both underground and aboveground structures) necessary for the Project’s proper functioning and operation, including all necessary foundations, walls, stairs, ramps, supporting structures, overhead contact systems, masts, etc.

Landscape design:

3.3.4. The Designer shall:

3.3.4.1. Identify existing trees and plants in the proposed LRT alignment and, taking due consideration of these and the impact of the land use, propose any necessary or desirable relocation;

3.3.4.2. Propose new trees and plants to be planted; and

3.3.4.3. Design the corresponding irrigation systems.

Deliverables:

3.3.5. Deliverables shall include:
3.3.5.1. Design reports, according to the stages of presentation/submission.

3.3.5.2. Site plans (urban planning and design, landscaping) at 1:500 scale, with cross-sections and elevations at significant points, at 1:100 or 1:50 scale as required. Plans and sections shall show adjacent buildings, structures, overhead contact systems masts and generally all LRT facilities;

3.3.5.3. Architectural drawings (stations, stops, buildings, structures) at appropriate scale, no less than 1:100 for plans and elevations; an

3.3.5.4. Computer generated photographic images of the existing alignment streetscape at specific locations, as modified to include the Project. The images shall be in color, A3 format and generated by using appropriate software. The exact location and content of images shall be as proposed by the Designer and approved by the Company.

3.4. **Civil Engineering Works**

*Civil Works - General*

**Topography:**

3.4.1. The Designer shall execute topographic surveys and provide all relevant surveys and data as required.

**Geology and soil conditions:**

3.4.2. The Designer shall collect all relevant existing, available data on geological and hydrogeological conditions, whether from the Company's own records or from other public or private projects carried out in the vicinity of the LRT alignment.

3.4.3. The Designer shall be responsible for identifying and defining any additional investigations and tests (including soil investigations, laboratory tests, etc.) which may be necessary for purposes of the design of the Project. It shall be the Designer’s responsibility to define in due time the program for such additional investigations and tests and to collect in due time all resulting data and information.

**Track and road layout:**

3.4.4. The Project Designer shall prepare a report and a complete set of layout and alignment plans, profiles and cross-sections (at-grade, elevated and/or underground, as required) covering:

3.4.4.1. The description and Preliminary Design in respect of all significant existing infrastructures and related facilities within or near the proposed LRT alignment;
3.4.4.2. The description and Preliminary Design of the proposed track, road and sidewalk arrangements (façade-to-façade), structures and facilities, with the alignment software input and output data supporting the alignment plans and profiles;

3.4.4.3. The description and Preliminary Design of proposed roads and streets for temporary and final traffic arrangements;

3.4.4.4. The description and Preliminary Design and calculations relating to surface water drainage;

3.4.4.5. Elements from all interfacing disciplines that affect the LRT alignment (including utilities, geotechnical conditions, hydrological conditions, buildings, structures, etc.);

3.4.4.6. Consideration of existing and future supporting private and public transport modes (feeder buses, taxi stands, “kiss & ride”, “park & ride” areas, etc.); and

3.4.4.7. Consideration of future extensions to the LRT system.

3.4.5. The layout of alignment drawings shall be such that north is at the top or right of the drawing and chainage intervals are at least every 50 meters.

3.4.6. Ties into survey control / landmarks are to be indicated.

**LRT stations and park & ride facilities:**

3.4.7. The Designer shall prepare a report and a set of layout plans, profiles and cross-sections covering:

3.4.7.1. The description of the proposed LRT stations and stops, identifying typical stations and stops (e.g. with lateral, or central platforms, etc.) and any special stations (e.g. underground stations, etc.);

3.4.7.2. For each station and stop, the preliminary structural and foundation calculations;

3.4.7.3. The description and calculations relating to drainage of the stations and stops, for each type;

3.4.7.4. For each station, stop and park & ride facility, a passenger capacity and traffic flow analysis;

3.4.7.5. For each park & ride facility, all roads, paths and means of accessibility (buses, taxies, bicycles, pedestrians, cars, etc.) and sub-areas for parking, kiss & ride, pickup parking, bicycle parking, etc.; and
3.4.7.6. A climate audit for stations and stops and design of means to protect passengers against climate conditions.

3.4.8. All plans and designs shall take into account the fare collection methodology selected.

**Deliverables:**

3.4.9. Deliverables shall include:

3.4.9.1. Design reports, according to the stages of presentation/submission, including:

3.4.9.1.1. A presentation of any proposed alternative alignments and comparative analyses;

3.4.9.1.2. A geotechnical report, including existing data collected and the program for further soil and ground condition investigations and drills;

3.4.9.1.3. Alignment calculations, pavement structure calculations, station/stop capacity/flow analyses and resulting geometrical and structural designs; and

3.4.9.1.4. A complete technical description of the proposed plans, proposals and solutions.

3.4.9.2. Drawings, which shall include:

3.4.9.2.1. General Project (key) plan at a scale of 1:20 000;

3.4.9.2.2. General Project LRT profile at a scale of 1:500/1:10 000, including indications of all road and street intersections, structures and utilities crossing the alignment;

3.4.9.2.3. Layout plans at a scale of 1:500 and profiles at scales of 1:50/1:500, showing the existing situation, the LRT and road proposed alignments, LRT stations/stops and bus stops, “park & ride” facilities, specific track equipment (switches etc.), proposed structural works (underground and aboveground structures), any ancillary facilities, principal roads, pedestrian areas, signage and all public and private property interfaces / impacts;

3.4.9.2.4. Plans, sections and elevations of typical and special track way structures, LRT station/stop structures, underground structures and ancillary facilities, at appropriate scale – drawings shall show adjacent buildings, structures and utilities; and
3.4.9.2.5. Cross-sections of the proposed LRT alignment and the surrounding roads and streets at a scale of 1:200, with details at a scale of 1:20 (including pavement structures, surface materials, drainage components, etc.) – cross-sections shall be provided for all typical and all special conditions (i.e. proximity to structures) and shall be drawn as viewed up chainage from the south.

**Civil Works - Buildings**

**Special stations:**

3.4.10. The Designer shall take into account that the design of some LRT stations will be of a special design (e.g. at historical locations, at terminals, incorporated in an existing or projected building or structure, underground, etc.).

3.4.11. In addition to the general requirements set out above, the Designer shall provide the description of each special LRT station’s structures, facilities and services (including HVAC).

**Power substations and operational facilities:**

3.4.12. The Designer shall provide the description of all proposed operational buildings, i.e. typical and any special power substations and any other ancillary facilities required for LRT operation.

**Deliverables:**

3.4.13. Deliverables shall include:

3.4.13.1. A design summary report with a description of the buildings, their structures and foundations and all relevant calculations.

3.4.13.2. Drawings, including:

3.4.13.3. Plans, sections and elevations of the buildings, at a scale of 1:100 – drawings shall show adjacent buildings, structures and utilities;

3.4.13.4. Preliminary civil and structural design drawings at a scale of 1:100; and

3.4.13.5. Preliminary mechanical and electrical (M&E) services (including, as and when applicable, water drainage, sewage, pumping systems and HVAC) design drawings in appropriate forms (e.g. flow schematics) and scales.
Civil works - Structural

Structures:

3.4.14. Structural works may include, as required for the Project, current and/or special underground structures, bridgeworks, tunnel works, retaining walls and stairs.

3.4.15. The Designer shall provide the description and Preliminary Design of each structure and associated facilities and equipment, as follows:

3.4.15.1. Determine the structural design parameters, including:

3.4.15.1.1. Traffic conditions and clearance profiles;

3.4.15.1.2. Design loads (including equipment where applicable);

3.4.15.1.3. The accommodating structures, which shall be designed to be able to bear the loads of the LRT rolling stock under operating conditions; and

3.4.15.1.4. Soil conditions (geological, hydrogeological and geotechnical);

3.4.15.2. Perform any additional soil investigations and tests which may be deemed necessary and define the program of investigations and tests required for the Detailed Design.

3.4.15.3. Carry out the geometrical (dimensions, profile) and structural design calculations.

3.4.15.4. Describe and design the associated equipment and/or services, such as:

3.4.15.4.1. Electrical installations: traction, power/overhead contact system, LV, low currents and lighting;

3.4.15.4.2. Drainage, sewage and (where applicable) pumping systems;

3.4.15.4.3. For underground structures: ventilation system and safety systems (fire detection and firefighting systems, emergency evacuation systems, signposting etc.), all in accordance with applicable laws and regulations;

3.4.15.4.4. For elevated structures: expansion joints, safety systems and emergency evacuation arrangements;

3.4.15.4.5. Track support arrangements;
3.4.15.4.6. Protection and support of potentially affected utilities or structures; and

3.4.15.4.7. Ease and safety of access for maintenance purposes (in accordance with urban conditions and public service conditions); and

3.4.15.5. Describe and design the proposed construction methods and phasing of the execution of the works.

**Deliverables:**

3.4.16. Deliverables shall include:

3.4.16.1. Design summary reports for each structure, including:

3.4.16.1.1. Summary review of the soil conditions;

3.4.16.1.2. Presentation of the alternatives considered, comparative analyses and description of the selected ones, including the relevant calculation notes; and

3.4.16.1.3. Description of the proposed construction methods and phasing.

3.4.16.2. Drawings at appropriate scale, including:

3.4.16.2.1. Civil engineering and structural drawings, including plan views (at a scale of 1:200 or 1:100), elevations, longitudinal profiles, characteristic cross-sections, with display of existing objects and respective soil conditions; and

3.4.16.2.2. Preliminary drawings for mechanical and electrical equipment and/or services (including, as applicable, drainage, pumping systems, sewage, HVAC etc.).

3.5. **Traffic Arrangement and Impact Plan**

Traffic management:

3.5.1. The Project Designer shall:

3.5.1.1. Analyze the existing traffic situation along the proposed LRT alignment;
3.5.1.2. Develop new, reorganized traffic arrangements for vehicles, public transport, cycles and pedestrians, all considering and with a view to implementation of the Project and based on traffic forecasts provided by Yefe-Nofo Model Experts;

3.5.1.3. Provide proposals regarding traffic lights and the LRT priority system;

3.5.1.4. Verify the capacity of junctions along the proposed LRT alignment or affected by it;

3.5.1.5. Highlight any necessary and proposed changes to the existing traffic situation (reduced lanes, forbidden turns, alternative access arrangements, changes in traffic direction, direction of flow, reduction/increase of parking spaces, changes in loading/unloading provisions, etc.) that are necessary or required as a result of LRT insertion and traffic priority measures;

3.5.1.6. Prepare traffic impact plans showing the impact of the insertion of the LRT on the traffic in the immediate vicinity and surrounding streets and roads; and

3.5.1.7. Design traffic lights and signaling at impacted intersections and junctions.

3.5.2. Those tasks shall be based on Israeli Guidelines which may be updated from time to time and on international guidelines when needed, all as approved by the Company. Further, those tasks shall be carried out in close coordination with the Company and the relevant authority (Netivei Israel, local and municipal authorities, the MoT and the Police), to ensure consistency in traffic engineering and management.

Traffic management during construction:

3.5.3. The Designer shall verify the feasibility of the alternative temporary traffic arrangements during construction works, as such feasibility may affect some LRT alignment options and design all required temporary traffic arrangements.

3.5.4. The Designer shall take into account that temporary traffic arrangements might need to be implemented outside of the “blue line” (boundary) of the statutory plan for the Project (National Infrastructure Plan No. 56). The Designer shall design all required temporary traffic arrangements, even those required to be implemented outside of the “blue line”.

Deliverables:

3.5.5. Deliverables shall include:

3.5.5.1. Design reports, according to the stages of presentation/submission:
3.5.5.1.1. A preliminary conceptual traffic management report, considering traffic issues along the proposed LRT alignment and related to the LRT operation;

3.5.5.1.2. Capacity checks of signalized junctions based on the last updated run of the Yefe-Nof Model, on an agreed format; a micro-simulation of the main junctions will be carried out, using appropriate LRT and motor vehicle traffic software; and

3.5.5.1.3. A design summary traffic report, presenting all design process considerations, study of alternatives and decisions taken during the work leading to the recommended and anticipated traffic arrangements.

3.5.5.2. Traffic arrangement plans at a scale of 1:500 for general plans and at a scale of 1:250 for major intersections (drawings to include principal street signage) and dense urban areas, showing the existing and proposed traffic arrangements, including right-of-way lines and boundaries of public open spaces, cycle paths, pedestrian crossings, LRT stations/stops and bus stops, “park & ride” facilities, “kiss & ride” facilities, car parking facilities, loading/unloading zones and private and public property access issues. Cross-sections at appropriate scale shall highlight proposed pavement/sidewalk widening or realignment features.

3.6. **Rail Systems**

**Track system:**

3.6.1. The Designer shall:

3.6.1.1. Describe and define the various track components and their characteristics, including:

3.6.1.1.1. Track bed types;

3.6.1.1.2. Rails;

3.6.1.1.3. Fastenings;

3.6.1.1.4. Sleepers; and

3.6.1.1.5. Track equipment (switches, crossovers, expansion joints, etc.); and

3.6.1.2. Determine the location of each type of track bed, rail and track equipment, all in accordance with the geographical constraints (e.g. bridgeworks) and operating principles.
Energy supply and distribution systems:

3.6.2. The Designer shall:

3.6.2.1. Determine the power supply requirements of the proposed LRT line and associated arrangements;

3.6.2.2. Carry out power supply simulations for normal and degraded modes of operation and determine the electrical sections;

3.6.2.3. Determine the location of the substations from which both traction (DC) and low voltage (AC) power will be distributed;

3.6.2.4. Identify the source(s) and route(s) of high voltage power supply. In this regard, the Designer shall liaise with the Israel Electric Corporation (IEC); and

3.6.2.5. Define all the relevant functional and technical characteristics of the power substations and their equipment, in accordance with the operation principles, including:

3.6.2.5.1. Rectifier units;

3.6.2.5.2. Middle voltage units;

3.6.2.5.3. DC power supply and distribution;

3.6.2.5.4. Current return;

3.6.2.5.5. Low voltage supply and distribution (equipment and network);

3.6.2.5.6. Safety principles;

3.6.2.5.7. Substation remote control and monitoring system;

3.6.2.5.8. Stray current protection;

3.6.2.5.9. Interface with IEC;

3.6.2.5.10. Typical equipment layout; and

3.6.2.5.11. Typical substation geometrical design.

Overhead Contact System (OCS):

3.6.3. The Designer shall:

3.6.3.1. Describe and define the various OCS components and their characteristics, including:
3.6.3.1.1. Contact wire(s);

3.6.3.1.2. Masts (various types and functions) or fastening devices in tunnels;

3.6.3.1.3. Supporting devices;

3.6.3.1.4. Tensioning devices; and

3.6.3.1.5. Mast foundations (for each type and according to soil conditions); and

3.6.3.2. Provide a preliminary staking layout at a scale of 1:500, identifying the types of masts and foundations and the electrical sections, all in accordance with the geographical constraints (e.g. bridgeworks or underground structures, existing maintained or relocated utilities) and operating principles.

Lighting installations:

3.6.4. The Project Designer shall describe and design the networks and equipment in relation to:

3.6.4.1. Street (public) and station/stop lighting: local distribution units, types of poles and lighting devices, based on the architectural lighting study mentioned above and as approved by the Company;

3.6.4.2. Special lighting for any special works, e.g. underground structures (general and emergency lighting) or bridgeworks (special poles and fixing, artistic lighting arrangements, if any, etc.); and

3.6.4.3. Special lighting for security requirements.

Low voltage and light current systems:

3.6.5. The Designer shall describe the various installations and equipment in relation to:

3.6.5.1. LRT signaling, with descriptions of the following for each identified train maneuver:

3.6.5.1.1. Track circuits;

3.6.5.1.2. Interface with traffic light signaling;

3.6.5.1.3. Projected train routes; and

3.6.5.1.4. Hazards and troubleshooting monitoring; and
3.6.5.2. Cable transmission network, Operating Control Centre (OCC) equipment, SCADA system, Automatic Vehicles Location (AVL) and Public Information (PI) systems, public address, communication systems, fare collection system, video surveillance system, access control systems, security cameras etc., with a description of the following for each system:

3.6.5.2.1. Equipment and components functional and technical constraints and specifications;

3.6.5.2.2. System general architecture;

3.6.5.2.3. Targeted objectives; and

3.6.5.2.4. Supply and cable trays (when applicable).

Deliverables:

3.6.6. Deliverables shall include:

3.6.6.1. A design summary report with the functional and technical descriptions of each system above (acceptance of rolling stock and systems commonality) being addressed in detail, in accordance with the operating principles to be developed as per the applicable sections of this document;

3.6.6.2. Drawings at appropriate scales of track equipment (track layout is included in the general 1:500 site plans), power supply sectioning, typical power substations equipment layout, typical OCS equipment and the preliminary staking layout of OCS masts/fastenings at a scale of 1:500, typical lighting poles and devices, station equipment layout and power supply arrangements, etc.; and

3.6.6.3. Sketches and diagrams displaying the architecture of the various systems and the power single line diagram.

3.7. Rolling Stock

Equipment:

3.7.1. The Designer shall describe the basic characteristics of the rolling stock equipment proposed, including:

3.7.1.1. Slope, turning radius and cant criteria, in accordance with the alignment design;

3.7.1.2. Length;

3.7.1.3. Width;

3.7.1.4. Floor height;
3.7.1.5. High / low access;
3.7.1.6. Weight;
3.7.1.7. Static / dynamic envelope;
3.7.1.8. Train configuration;
3.7.1.9. HVAC;
3.7.1.10. Propulsion;
3.7.1.11. Wheel / rail interface;
3.7.1.12. Low voltage;
3.7.1.13. Multiple units;
3.7.1.14. Internal arrangements and fittings;
3.7.1.15. Aesthetics of the vehicles; and
3.7.1.16. Cab driver simulator.

Deliverables:

3.7.2. Deliverables shall include:

3.7.2.1. A design summary report with the functional and technical descriptions of the rolling stock equipment proposed;

3.7.2.2. Drawings (plan views, elevations and/or cross-sections, as required) at appropriate scales of the vehicle (including proposed internal arrangements), driving cab, coupling arrangements in case of multiple units, etc; and

3.7.2.3. 3-D imaging of the vehicle and/or train in case of multiple units (at least three (3) aesthetic design proposals are required).

3.8. OCC and Depot Site

Requirements:

3.8.1. The Designer’s role in respect of the Preliminary Design of the depot and workshop shall cover the architectural design and include all the other aspects and the overall coordination and function, as described below. The Designer shall:
3.8.1.1. Determine the operational and space requirements for the depot and workshop, including OCC (primary and secondary) and administration/management facilities, based on the operating principles developed as per the applicable sections of this document, taking into account possible line and/or LRT extensions and potential increases in the rolling stock fleet; and

3.8.1.2. Develop the selected solution, including:

3.8.1.2.1. The Preliminary Design of the internal depot and workshop facilities;

3.8.1.2.2. The Preliminary Design of the connection to the LRT line and associated infrastructure and equipment; and

3.8.1.2.3. Consideration for phasing the construction of the various facilities up to ultimate capacity.

**Deliverables:**

3.8.2. Deliverables shall include:

3.8.2.1. Design reports, according to the stages of presentation/submission:

3.8.2.1.1. Presentation report of operational requirements and comparative analyses; and

3.8.2.1.2. Design summary report with the complete technical description of the selected plans and solutions.

3.8.2.2. Drawings, including:

3.8.2.2.1. General site plan at a scale of 1:500, with the layout of track, road, structures, buildings, equipment, maintenance tools and any ancillary facilities;

3.8.2.2.2. Elevations and cross-sections at appropriate scale, at specific locations;

3.8.2.2.3. Architectural drawings at appropriate scale, but of no less than 1:100 for plans and elevations;

3.8.2.2.4. A preliminary OCS staking layout at a scale of 1:500, identifying the types of masts and foundations and the electrical sections;

3.8.2.2.5. Train signaling and maneuvering principles; and

3.8.2.2.6. Schematic diagram for traction power supply;
3.8.2.3. OCC principles definition;

3.8.2.4. 3-D imaging of the proposed depot and workshop area (to display the phased development of the site and various points of view as approved by the Company); and

3.8.2.5. List of depot and workshop equipment.

3.9. Operating Principles

Requirements:

3.9.1. Taking into account the traffic forecasts to be provided by Yefe-Nof’s Model Experts, the Designer shall:

3.9.1.1. Define the LRT line route (including branches and/or short services if and when appropriate). In this process the Designer shall also:

3.9.1.1.1. Identify extensions which may be considered in the long-term;

3.9.1.1.2. Identify the optimal staging for the line development in the short and medium term;

3.9.1.1.3. Identify derogated mode for the line operation;

3.9.1.1.4. Identify specific services for the line operation (e.g. Sunday service for soldiers); and

3.9.1.1.5. Identify the priority for the trains at junctions and intersections;

3.9.1.2. Determine and optimize the position of the stations and stops;

3.9.1.3. Determine the service conditions for each stage in respect of:

3.9.1.3.1. Commercial speed: simulations shall be carried out taking into account rolling stock performance criteria, dwelling time at stations/stops, regulation requirements, crossing of junctions, etc.;

3.9.1.3.2. Headways and timetables (peak/off peak);

3.9.1.3.3. Nominal and degraded modes (taking into account Shabbat);
3.9.1.3.4. Rolling stock fleet sizing; and

3.9.1.3.5. Energy consumption; and

3.9.1.4. Determine the principles for control and management of the LRT operations.

**Deliverables:**

3.9.2. Deliverables shall include:

3.9.2.1. Design reports, according to the stages of presentation/submission:

3.9.2.1.1. Presentation reports of the routes, stages, interoperability considerations, positioning of stations/stops, with comparative analyses, for the Company’s approval;

3.9.2.1.2. Description of the operating service conditions, including speed diagrams; and

3.9.2.1.3. A LRT operations report with a complete technical description of the recommended plans and solutions; and

3.9.2.2. Operation schematic diagrams, covering the full LRT line and the development stages, position and mode of operation of switches, terminal reversing areas, third track if any, partial services if any, connections to the depot, etc.

3.10. **Project Preliminary Report**

3.10.1. The Designer shall prepare a comprehensive report including and covering all the above-mentioned matters and taking into account and consideration all the below-mentioned matters (the “Preliminary Design Report”). The Preliminary Design Report and associated material shall cover all topics listed above.

**Statutory documentation:**

3.10.2. The Designer shall study all documentation in respect of the statutory process according to the planning and building laws and regulations and in respect of the local and district committees’ requests and instructions.

3.10.3. This documentation includes, but is not limited to:

3.10.3.1. The statutory plan itself (“Tasrit”);

3.10.3.2. The associated instructions (“Takanon”);
3.10.3.3. The traffic arrangements plan;
3.10.3.4. The architectural and landscaping development plans;
3.10.3.5. The building stages drawings;
3.10.3.6. Longitudinal sections and cross-sections; and
3.10.3.7. Any other drawings.

3.10.4. As part of this process, the Designer shall complete and submit to the National Infrastructure Committee (VATAL) each document needed to obtain the final statutory approval and carry out all associated and necessary tasks and activities, including the following:

3.10.4.1. Attend to the statutory staff meetings and the statutory committees' meetings;
3.10.4.2. Prepare and submit the design drawings and other materials to the different municipality and government departments;
3.10.4.3. Carry out any modifications to the Project’s statutory plan during the process, as required;
3.10.4.4. Coordinate the Project’s statutory plan with other relevant statutory plans and participate in the corresponding coordination/interfacing meetings;
3.10.4.5. Present the design drawings to the public (community centers, etc.); and
3.10.4.6. Prepare answers to enquiries and related materials, as required.

Environmental Impact Survey:

3.10.5. As part of the statutory process, the Designer shall carry out an Environmental Impact Survey. In this respect, the Designer shall undertake all required investigations, studies, tasks and activities, including the following:

3.10.5.1. Present the design to the appropriate bodies and/or authorities (Ministry for the Protection of the Environment, municipal departments, local and district committees, neighborhood representatives, etc.) in order to obtain comments and input;
3.10.5.2. Prepare reports in accordance with the Environmental Impact Survey and any specific instructions and specifications issued by the Ministry for Protection of the Environment. The topics to be covered in the report shall include, but not be limited to the impact of the Project in terms of:
3.10.5.2.1. Architecture;
3.10.5.2.2. Urban integration of the Project in the surrounding area;
3.10.5.2.3. Noise;
3.10.5.2.4. Vibrations;
3.10.5.2.5. Electromagnetic interferences (EMI); and
3.10.5.2.6. Air pollution;

3.10.5.3. Prepare drawings and tables emphasizing potential sensitivities and conflicts and their resolutions;
3.10.5.4. Present alternatives and provide a comparative analysis supporting the recommended solution;
3.10.5.5. Provide a detailed description of the proposed arrangements addressing all engineering and system aspects as well as the operation plan;
3.10.5.6. Analyze the impact of changing traffic arrangements on the surrounding environment outside the statutory boundaries;
3.10.5.7. Present the Environmental Impact Survey and reports to the various relevant third parties, such as the Ministry for Protection of the Environment, municipalities, statutory committees, environmental organizations, public stakeholders (e.g. shopkeepers and property owners), neighborhood representatives and community leaders;
3.10.5.8. Obtain full approval for the reports comprising the Environmental Impact Survey by the Ministry for Protection of the Environment and the MoT;
3.10.5.9. Prepare specific measurements and projections regarding noise, vibrations, EMI and pollution, for specific buildings, facilities, etc., all as required during the statutory process;
3.10.5.10. Prepare materials such as power point presentations and documentation to respond to public requests and objections during the statutory process; and
3.10.5.11. Prepare images of the Project and visual representations of the Project’s integration in its environment.

Specific provisions:
3.10.6. Notwithstanding the Project’s general provisions, all statutory documentation shall be produced in Hebrew, with an English translation as and when required.

3.11. Schedule of Works

3.11.1. The Designer shall prepare an overall schedule of works, to a level of detail consistent with the Preliminary Design being produced. The preparation shall include the following:

3.11.1.1. A Detailed Design phase which includes the full process of the design (e.g. origination, collecting data, criteria, survey, design and approval process, statutory approval, etc.);

3.11.1.2. An outline schedule of the works (detailed engineering design and construction) for the various development stages identified, per section of the Project;

3.11.1.3. An analysis of construction planning, methodology and organization for the first stage of the Project, in order to identify optimal construction and operation phasing. The analysis shall cover plausible options and illustrate the Designer’s recommendations, with drawings and sketches clarifying the sequence of construction works and methodology, necessary temporary works (including ground preparation and traffic arrangements), utility relocation sequences and identification of all public and/or private entities with which coordination will have to be achieved. The analysis shall cover methods of procurement for civil works (design-build or build only). The analysis shall also take into account possible future extensions to the LRT line;

3.11.1.4. A detailed schedule of the works (detailed engineering design and construction) for the first stage of the Project, on the basis of the analysis above; and

3.11.1.5. A time schedule for the first stage of the Project, including tasks ranging from utilities relocation to commercial operations start-up.

3.12. Investment Cost Estimate

3.12.1. The Project Designer shall prepare an overall capital investment cost estimate of construction works, for all stages, to a level of detail consistent with the Preliminary Design being produced. The format shall be as approved by the Company and shall identify:

3.12.1.1. Clearly defined Project components as items;

3.12.1.2. Clearly defined geographical sections; and
3.12.1.3. Each development stages.

3.13. **Executive Summary Report**

3.13.1. The Designer shall prepare a Preliminary Design Executive Summary Report in Hebrew (having formal standing) and in English, covering all the above design issues. The table of contents of this Executive Summary Report shall be subject to prior approval by the Company.

3.14. **Detailed Design Documents**

3.14.1. As part of the Preliminary Design Report the Designer shall provide a list of all documents (reports, drawings, etc.) to be produced for Detailed Design.

3.14.2. The documents shall include a document which recommends, with detailed explanations and justifications, divisions of tenders for civil works and divisions between Infra 1 Works and Infra 2 Works.

4. **Detailed Design of Civil Works**

4.1. **Input Data and Output Documentation**

4.1.1. Following approval of the Preliminary Design, the Designer shall proceed with the Detailed Design for civil works.

4.1.2. Infra 1 Works tenders will be design-build or build-only contracts.

4.1.3. The Detailed Design process to be undertaken by the Designer shall be comprehensive and include all tasks, activities and preparation of documentation as is required for the proper Detailed Design of the applicable parts of the Project, including (without limitation) the following:

4.1.3.1. Preparing the Detailed Design for the civil works of the Project, considering the list of Detailed Design documents and the design methods produced in the Preliminary Design stage, being adapted as necessary and completed as necessary;

4.1.3.2. The preparation of tender documents for build-only contracts, according to the division of the sections and tenders as decided pursuant to the Preliminary Design stage. The tenders (approximately fifteen (15)) shall be required to be prepared in parallel and the Designer shall ensure that it has sufficient human and other resources to undertake this task properly and without delay;

4.1.3.3. Addressing and resolving all open comments from DRS (Design Review Sheets);

4.1.3.4. Completion of all outstanding and open tasks from the Preliminary Design stage;
4.1.3.5. Preparation and update of topographic and all other required surveys, tests and investigations (including in respect of soil and ground conditions); and

4.1.3.6. The preparation of all required design drawings, plans, specifications and documents required for construction works.

4.2. **Detailed Design**

**General**

4.2.1. In addition to and without derogating from any of the design-related tasks, activities and obligations stipulated above, the Designer shall be responsible to perform all Detailed Design-related tasks, activities and obligations set forth below.

4.2.2. The Detailed Design shall include:

4.2.2.1. Providing a detailed technical and functional description of the applicable works, including:

4.2.2.1.1. Detailed layout plans (façade-to-façade);

4.2.2.1.2. Characteristics and dimensions;

4.2.2.1.3. Associated calculation notes and verifications;

4.2.2.1.4. Nature and quality of the materials and equipment, and corresponding workmanship requirements;

4.2.2.1.5. Technical specifications, general arrangements and layout of equipment required for operations;

4.2.2.1.6. Operating plan: normal and degraded modes; and

4.2.2.1.7. Testing and commissioning requirements;

4.2.2.2. Providing the bills of quantities, the Designer’s construction cost estimates and a projection of the operating and maintenance costs of the Project;

4.2.2.3. Defining the appropriate work packages to be tendered for build-only contracts;

4.2.2.4. Preparing a detailed implementation work schedule; and
4.2.2.5. Preparing and presenting the necessary building permit applications.

Architecture and landscaping:

4.2.3. The Designer shall prepare:

4.2.3.1. Architectural and landscaping arrangements (façade-to-façade) at a scale of 1:250 (including materials, surface treatment, paving and joint assembly principles, plants, watering system, urban furniture, artworks, fountains, etc.), with cross-sections, typical and specific details at appropriate scale (1:50, 1:20);

4.2.3.2. Architectural arrangements for stations/stops (typical and specific) at a scale of 1:50, with canopy, furniture and station equipment layout and plan views, cross-sections and details of platforms at a scale of 1:20;

4.2.3.3. General arrangements at a scale of 1:250 for bus connections, terminals or other specific stations; and

4.2.3.4. Plan views, elevations, cross-sections at a scale of 1:50 for power substations (typical and specific, if any) and any other operational facilities, with details at appropriate scale.

Topography survey:

4.2.4. The Designer shall execute and provide all updated detailed topography relevant surveys as required.

Civil engineering works generally:

4.2.5. The Designer shall undertake:

4.2.5.1. Geological and geotechnical analyses;

4.2.5.2. Geological mapping; and

4.2.5.3. Complete soil investigation and test reports (mapping, sections) as appropriate for the Project structural works, buildings, bridges, tunnels, track, road platforms and OCS mast foundations.

4.2.6. The Designer shall be responsible for identifying and defining any additional investigations and tests (including soil investigations, laboratory tests, etc.) which may be necessary for purposes of the design of the Project. It shall be the Designer’s responsibility to define in due time the program for such additional investigations and tests and to collect in due time all resulting data and information.

4.2.7. The Designer shall prepare:
4.2.7.1. Track and road geometric designs;

4.2.7.2. General Project (key) plan at a scale of 1:20 000 and synoptic plans at 1:5 000; and

4.2.7.3. Site layout plan views at a scale of 1:250, including existing situation, Project track and road layout, stations, curbstones, sidewalks, bicycle paths, bus stops, “park & ride” and “kiss & ride” facilities, structural works and buildings (including existing structures to be demolished), multi-tube cable ducts, pulling chambers, manholes, track equipment, OCS masts, road markings and signing, LRT signaling and traffic light equipment, urban furniture, plants, etc. and showing the Project boundaries.

4.2.8. The track layout mentioned above shall identify the types of track laying methods and the canted areas and also show the following geometric characteristics:

4.2.8.1. Beginning and end of straight alignments;

4.2.8.2. Beginning and end of curves; and

4.2.8.3. Beginning and end of clothoids;

and be supported, for each rail, by a list of points with their three-dimensional positioning, at the following intervals:

4.2.8.4. one (1) point each ten (10) meters for straight alignment;

4.2.8.5. one (1) point each five (5) meters for curves; and

4.2.8.6. one (1) point each two (2) meters for clothoids.

4.2.9. The Designer shall also prepare:

4.2.9.1. Longitudinal profiles of all pavements along axis and gutter (existing and required for the Project) and of each rail, at scales of 1:50/1:500, including indications of all main roads and street intersections, structures and utilities crossing the alignment;

4.2.9.2. Typical cross-sections at scales of 1:50/1:100.

4.2.9.3. Cross-sections every ten (10) meters along track and twenty (20) meters elsewhere, at scales of 1:50/1:100 (existing and required for the Project façade-to-façade) and providing levels, connections to adjacent properties, drainage and cable ducts, etc;

4.2.9.4. Levelling plans and functional plans of junctions, at a scale of 1:100;

4.2.9.5. Track and road horizontal and vertical alignment specifications;
4.2.9.6. Road markings and signage (including direction signage) details; and

4.2.9.7. Associated description and calculation notes.

Drainage

4.2.10. The Designer shall prepare:

4.2.10.1. Characteristics of catchment basins and water tables;

4.2.10.2. Identification of storage areas and outlets and verification of their capacity;

4.2.10.3. Schematic network at appropriate scale (1:5 000 or 1:2 000);

4.2.10.4. General layout, including gutters, ducts and connections (outlets) to the primary network and providing manhole and duct invert levels;

4.2.10.5. Technical specifications for track bed drainage;

4.2.10.6. Typical and specific manhole details; and

4.2.10.7. Associated description and calculation notes.

Earthworks and pavements

4.2.11. The Designer shall undertake:

4.2.11.1. Identification of nature and characteristics of cut materials, identification of possibility of usage as fill materials, determination of alternative sources of adequate fill materials and calculation of the earthwork volumes;

4.2.11.2. Identification of pavement categories: new and existing to be demolished, rebuilt, strengthened, resurfaced, etc;

4.2.11.3. Identification of pavement and track bed bearing capacity requirements, according to the expected traffic type, volumes and loads to be borne, in respect of:

4.2.11.3.1. Segregated areas (LRT only, road vehicles only);

4.2.11.3.2. Shared areas (LRT and road vehicles);

4.2.11.3.3. Junctions and intersections; and

4.2.11.3.4. Bicycle and pedestrian areas;
4.2.11.4. Determination of any foundation course/soil treatment requirements;

4.2.11.5. Design of roads, streets, pavements, sidewalks and all associated and ancillary structures (with calculation notes);

4.2.11.6. Design of the concrete track bed platforms (with calculation notes);

4.2.11.7. Determination and preparation of any special design(s) required in respect of any noise and/or vibration sensitive areas;

4.2.11.8. Definition of surface course requirements (e.g. bearing capacity of the track bed surface course, to enable fire trucks passage) – the materials defined under the architectural and landscaping arrangements (above) shall meet these requirements;

4.2.11.9. Technical specifications for sidewalk/pavement structures and sidewalk/pavement materials, including execution constraints, tolerance margins, etc; and

4.2.11.10. Associated description and calculation notes.

**Stations and stops**

4.2.12. The Designer shall prepare:

4.2.12.1. Typical civil engineering and structural plans for typical station/stop platforms (e.g. axial, lateral), including manholes and ducting;

4.2.12.2. Specific adaptation plans for each station/stop, including plan views, elevations and cross-sections, at appropriate scale;

4.2.12.3. Associated description (including soil conditions) and calculation notes;

4.2.12.4. Design of any special stations (e.g. at historical locations, at terminals, incorporated in an existing or projected building or structure, underground LRT station, etc.); and

4.2.12.5. Associated description and calculation notes.

4.2.13. In addition to the general requirements stated above, the Designer shall provide the design of each special station’s structures, facilities and services (including HVAC).

**Parking area**
4.2.14. For all park & ride facilities, all roads, paths and means of accessibility (buses, taxies, bicycles, pedestrians, cars, etc.) and all sub-areas for parking, kiss & ride, pickup parking, bicycles parking, etc, the Designer shall prepare:

4.2.14.1. Foundation plans, civil engineering and structural plan views, elevations, cross-sections at a scale of 1:50 and details at appropriate scale; and

4.2.14.2. Associated description (including soil conditions) and calculation notes.

**Buildings**

4.2.15. For each building, the Designer shall prepare:

4.2.15.1. Foundation plans, civil engineering and structural plan views, elevations, cross-sections at a scale of 1:50 and details at appropriate scale; and

4.2.15.2. Associated description (including soil conditions) and calculation notes.

4.2.16. Underground stations shall be designed as building structures.

4.2.17. Substations for electric power shall be designed as building structures.

**Structural works**

4.2.18. For each structure, the Designer shall prepare:

4.2.18.1. Specific layout plans at appropriate scale and elevation at same scale;

4.2.18.2. Longitudinal profiles and cross-sections at same scale horizontally and ten (10) times larger vertically;

4.2.18.3. Transversal cross-sections at a scale of 1:20;

4.2.18.4. Construction details at appropriate scale;

4.2.18.5. Structural drawings (e.g. foundations, formwork, lining) at appropriate scale;

4.2.18.6. Associated description (including soil conditions) and calculation notes; and

4.2.18.7. Specific cost estimates for structural works and elements.

**Utilities relocation:**
4.2.19. The Detailed Design shall be based on the approved Preliminary Design and corresponding relocation and coordination concepts, as approved by the various utilities bodies/authorities, whilst following the Project’s detailed design development.

4.2.20. Greater data resolution and accuracy may be required with respect to location and depth of underground utilities, to be obtained by one or more of the following methods to be executed by the Designer:

4.2.20.1. Field survey of data from the various utilities manholes;

4.2.20.2. Radio detection site survey of cable routes, pipe routes, or up to a full site survey (this is the most advised practice as it improves significantly the accuracy of the data collected); and/or

4.2.20.3. Site check boreholes (this is the most accurate method, but also the most invasive, expensive, complicated and disturbing; it should, therefore, be used only in very specific locations). The Designer shall use the Company’s approved contractor for borehole checks, at the Company’s cost.

4.2.21. The utilities routes located as aforesaid shall be marked up on site, temporarily or with traffic paint and pegs, as required. The network of surveyed utilities shall then be captured using total stations and added to the digital base plan. Plans shall be produced with utilities structured in easily identifiable layers.

4.2.22. The Designer shall perform an implementation and constructability analysis in order to identify optimal utilities relocation staging.

4.2.23. The Designer shall also provide general proposals with respect to stray current monitoring and protection measures to be implemented for the operating phase of the LRT system.

4.2.24. The Designer shall prepare all associated description and calculation notes.

4.2.25. The Designer shall obtain the bill from the utilities bodies/authorities to be paid by the Company.

Overhead Contact System (OCS)

4.2.26. The Designer shall prepare:

4.2.26.1. Protection principles;

4.2.26.2. Staking layout at a scale of 1:250, identifying types of masts and foundations and electrical sections;

4.2.26.3. Design of particular points;

4.2.26.4. Typical equipment and cable installation layout;
4.2.26.5. Electrical supply and sectioning diagram;

4.2.26.6. Design of each type of mast and (based on soil conditions and the underneath environment) of the associated foundations;

4.2.26.7. Supporting arrangements (typical line, particular points, underground sections, etc.); and


**Lighting installations**

4.2.27. The Designer shall prepare:

4.2.27.1. Lighting equipment layout at a scale of 1:250, identifying types of poles and foundations or supporting devices, types of lighting devices, etc;

4.2.27.2. Photometric studies;

4.2.27.3. Electrical supply diagrams;

4.2.27.4. Electrical protection designs;

4.2.27.5. Associated description and calculation notes;

4.2.27.6. Design details for lighting for temporary stages of the works; and

4.2.27.7. Design detail for lighting for final stage of the works.

**LRT signaling**

4.2.28. The Designer shall produce:

4.2.28.1. General architecture;

4.2.28.2. Equipment and cable layouts;

4.2.28.3. Details of interfaces with track equipment (switches etc.);

4.2.28.4. Details of interfaces with traffic light signaling; and

4.2.28.5. Associated description and calculation notes.

**Traffic light signaling**

4.2.29. The Designer shall produce:

4.2.29.1. General architecture;
4.2.29.2. Equipment and cable layouts, including vehicle detection devices, both for junction traffic light equipment and LRT priority system;

4.2.29.3. Detailed junction design and traffic light settings, including design of priority for LRT in junctions, with calculation notes and safety checks, all with the approval of the MoT; and

4.2.29.4. Micro-simulation of major junctions, as defined by the Company; and

4.2.29.5. Associated description and calculation notes.

Specific and miscellaneous equipment

4.2.30. The Designer shall specify the details and any and all specific or special fire-fighting networks, fire detection systems, pumping systems (for drainage and/or sewage networks), etc.

Depot and workshop:

4.2.31. The Designer shall provide:

4.2.31.1. A general site plan at a scale of 1:500;

4.2.31.2. Site plan views at a scale of 1:250 with the layout of track, road, structures, buildings, equipment, maintenance tools and any ancillary facilities;

4.2.31.3. Layouts and diagrams for track, track equipment, OCS, multi-tube cable ducts, structures, buildings, systems, OCC, internal building equipment, internal and external cables, etc., which shall show the same characteristics as indicated above for the corresponding components;

4.2.31.4. Site elevations and cross-sections at appropriate scale;

4.2.31.5. Earthworks and utilities relocation;

4.2.31.6. Architectural drawings (buildings, structural works, etc.) at appropriate scale, but no less than 1:50 for plans, elevations and cross-sections; and

4.2.31.7. Associated descriptions (including specific tools) and calculation notes.

Cyber and Security:
4.2.32. The Designer shall design according to all cyber and security requirements specified by the Company and/or applicable laws.

4.3. **Construction Works, Building Permits and Cost Estimates**

**Phasing of the works and construction methods:**

4.3.1. The Designer shall prepare a report addressing the following:

4.3.1.1. A description of the construction methods envisaged and the corresponding phasing, outlining the functional worksite constraints, which will enable contractors to assess the impact of construction works on the urban environment, as well as on their own worksites. This shall include road traffic aspects, pedestrians, nearby residents and shops, etc;

4.3.1.2. Phasing of the works shall be detailed by way of cross-sections at appropriate scale, showing:

4.3.1.2.1. The complete sequence of works from the existing situation to the final arrangements; and

4.3.1.2.2. For each phase, the worksite boundaries, spaces available for road and pedestrian traffic, the safety arrangements provided (taking into account the relevant health and safety laws and regulations) and the specification of all works to be carried out in the applicable phase;

4.3.1.3. Phasing and designing of the traffic arrangements during the works shall include, for each phase:

4.3.1.3.1. A general traffic management plan;

4.3.1.3.2. A description of the temporary arrangements for the applicable junctions and their operation;

4.3.1.3.3. A description of the impacted road network operations (traffic lights, signing and markings).

4.3.1.3.4. A Detail Design for the phases, including temporary traffic arrangements, traffic lights, signage and markings and relevant authority approvals for each phase; and

4.3.1.3.5. A Detail Design of traffic lights, including using the software by approved by the MoT.

**Interfaces management and monitoring:**
4.3.2. The Designer shall prepare a list of technical, functional and spatial interfaces, as identified between the various disciplines involved (including between the various contractors which may be involved) and a monitoring methodology. Interface specifications shall be established so that the contractors’ scopes of work and interfaces are defined thoroughly.

Worksite management:

4.3.3. The Designer shall produce a worksite management report showing, at a scale of 1:250, the statutory boundaries as well as worksite installations and compounds, supply and storage sites, sanitary equipment, aid stations and the proposed means to determine worksite boundaries.

Statutory Plan environmental requirements and Building Permits:

4.3.4. The Designer shall be responsible for:

4.3.4.1. Preparation of all material (drawings, surveys, etc) required by the statutory plan for the project (National Infrastructure Plan No. 56) for the issuance of design approval and building permits by VATAL, including (without limitation) detailed architectural drawings, detailed environmental reports, static calculations, any mitigating arrangements (e.g. noise protection, prevention of water table pollution, climate report at stations, etc) and the like;

4.3.4.2. Preparation of the drawings required for design approval and building permits application to VATAL (with preparation of the application itself to be carried out by the Statutory Team Architect);

4.3.4.3. Submission of the required design drawings to VATAL, with specific registration for each of the building permits required to be obtained;

4.3.4.4. Presentation to and obtaining approval by VATAL (and any other Government departments) as required for obtaining the building permits;

4.3.4.5. Preparation of any modifications required to building permit-related design drawings and approval by the relevant authorities/committees where applicable; and

4.3.4.6. Obtaining the required detailed design approval and issuance of building permits.

4.3.5. The processes and procedures described above in respect of obtaining the required detailed design approval and issuance of building permits shall apply to and be carried out for and in respect of both the Infra 1 Works and the Infra 2 Works.
4.3.6. Notwithstanding the Project’s general provisions, all building permit documentation shall be produced in Hebrew, with an English translation as and when required.

**Quantities and cost estimates:**

4.3.7. The Designer shall:

4.3.7.1. Define accurately the various items to be measured during the execution of the works and, thus, to be priced in the applicable bills of quantities. The format of the bills of quantities shall be approved by the Company, but in any event shall identify at least the following:

4.3.7.1.1. Each phase of the works;

4.3.7.1.2. The appropriate geographical sections; and

4.3.7.1.3. Individually, each major item of structural work;

4.3.7.2. Provide a construction capital investment cost estimate based on its own (substantiated) cost estimate of each of the various items to be measured during the execution of the works; and

4.3.7.3. Provide an analysis of the evolution between the construction capital investment cost estimate based on the Detailed Design and the construction capital investment cost estimate based on the Preliminary Design.

**Scheduling of the works:**

4.3.8. The Designer shall prepare a construction work schedule, to a level of detail consistent with the Detailed Design. This shall include:

4.3.8.1. A description of the construction work scheduling principles, specifying the worksite constraints (traffic, environment, special events, etc.), the various technical and functional task sequencing constraints, the phasing principles, etc;

4.3.8.2. A detailed schedule of the complete works (construction design, construction execution and testing and commissioning) for the first stage of the Project; and

4.3.8.3. A time schedule for the construction stage of the Project, including tasks ranging from utilities relocation to commercial operations start-up.

4.3.9. In addition, the Designer shall prepare a cash-flow schedule for the construction works, based on the work schedule provided and the detailed capital investment cost estimate produced as aforesaid.
Procurement strategy:

4.3.10. The Designer shall propose the most appropriate distribution of work packages for carrying out the construction works and prepare a specific schedule of the corresponding tender process.

Executive Summary Report:

4.3.11. The Designer shall prepare a Detailed Engineering Design Executive Summary Report in Hebrew (having formal standing) and in English, covering all the above design issues. The table of contents of this Executive Summary Report shall be subject to prior approval by the Company.

5. **Technical Engineering Documents for Infra 2 Tender**

5.1. **General**

5.1.1. The Designer shall prepare the scope of works, technical specifications and bills of quantities for the tender for the Infra 2 Works, either as a design-build tender or as a combination design-build/design-only tender, as shall be decided by the Company.

5.1.2. This tender documentation shall be prepared as follows:

5.1.2.1. Format of the tender documents to be agreed with the Company;

5.1.2.2. Full coordination with the Company’s technical advisers, legal advisers and financier advisers;

5.1.2.3. Draft tender documents to be based on the draft Preliminary Design Report; and

5.1.2.4. Final tender documents to be based on the approved Preliminary Design.

5.2. **Design for Infra 2 Tender**

*Mechanical and Electrical (M&E) fixed equipment*

**General**

5.2.1. In respect of mechanical and electrical (M&E) fixed equipment, the Designer shall provide all Project-wide general documents and, for each system below with its associated equipment, the following documentation:

5.2.1.1. Project/system overview;
5.2.1.2. Definitions;
5.2.1.3. Project/system grid and control points;
5.2.1.4. Functional specifications;
5.2.1.5. Technical specifications;
5.2.1.6. Interface specifications including interface matrix;
5.2.1.7. Reliability, Availability, Maintainability and Safety (RAMS) documentation, including analysis of the critical modes of failure, etc.;
5.2.1.8. Specific safety requirements;
5.2.1.9. Testing requirements;
5.2.1.10. Operating and maintenance requirements;
5.2.1.11. Training requirements (as a result of the previous items); and
5.2.1.12. All related technical reference documents and associated description and calculation notes.

Trackwork

5.2.2. In respect of trackwork, the Designer shall also provide:

5.2.2.1. Rail layouts and details;
5.2.2.2. Fastenings and vibration damping specifications;
5.2.2.3. Track equipment layouts (switches, crossovers, dilatation, etc.); 
5.2.2.4. Electrical isolation specifications;
5.2.2.5. Track platform drainage specifications;
5.2.2.6. Typical plans and cross-sections (rail fastening installations, etc.); and
5.2.2.7. Associated description and calculation notes.

Power systems

5.2.3. In respect of power systems, the Designer shall also provide:
5.2.3.1. Substation equipment layouts and civil engineering guide plans (HV units, HV/MV transformers, rectifiers, circuit-breakers, isolators, LV transformers, LV switchboards, battery chargers, cables, etc.);

5.2.3.2. Determination of the power supply requirements, electrical design calculations and simulations and harmonics calculations;

5.2.3.3. Single line diagrams (traction power, substations network, LV typical distribution, etc.);

5.2.3.4. Cable layouts and civil engineering guide plans;

5.2.3.5. Earthing principles;

5.2.3.6. Stray currents analysis and protection arrangements; and

5.2.3.7. Associated description and calculation notes (cable design, etc.).

**Overhead Contact System (OCS)**

5.2.4. In respect of the overhead contact system, the Designer shall also provide:

5.2.4.1. Protection principles;

5.2.4.2. Staking layouts at a scale of 1:250, identifying types of masts and foundations and electrical sections;

5.2.4.3. Design of particular points;

5.2.4.4. Typical equipment and cable installation layouts;

5.2.4.5. Electrical supply and sectioning diagrams;

5.2.4.6. Design of each type of mast and (based on soil conditions and the underground environment) of the associated foundations;

5.2.4.7. Supporting arrangements (typical line, particular points, underground sections, etc.); and

5.2.4.8. Associated description and calculation notes.

**Lighting installations**

5.2.5. In respect of lighting installations, the Designer shall also provide:

5.2.5.1. Lighting equipment layouts at a scale of 1:250, identifying types of poles and foundations or supporting devices, types of lighting devices, etc.;
5.2.5.2. Photometric studies;
5.2.5.3. Electrical supply diagrams;
5.2.5.4. Electrical protection specifications; and
5.2.5.5. Associated description and calculation notes.

**Low voltage and light current systems**

5.2.6. In respect of low voltage and light current systems, the Designer shall also provide:

5.2.6.1. For the cable transmission network, SCADA system, Automatic Vehicles Location (AVL) and Public Information (PI) systems, public address, time distribution, communication systems, fare collection system, video surveillance system and access control systems:

   5.2.6.1.1. General architecture;
   5.2.6.1.2. Cable layouts;
   5.2.6.1.3. Station equipment and cable layouts, with typical systems interface diagrams; and
   5.2.6.1.4. Associated description and calculation notes.

5.2.6.2. For the Operating Control Centre:

   5.2.6.2.1. Equipment and cable layouts;
   5.2.6.2.2. All systems interface analyses;
   5.2.6.2.3. Ergonomics/human factor analyses; and
   5.2.6.2.4. Associated description and calculation notes.

5.2.6.3. For the rail signaling:

   5.2.6.3.1. General architecture;
   5.2.6.3.2. Equipment and cable layouts;
   5.2.6.3.3. Details of interfaces with track equipment (switches, etc.);
   5.2.6.3.4. Details of interfaces with traffic light signaling; and
   5.2.6.3.5. Associated description and calculation notes.
5.2.6.4. For the traffic light signaling, the Designer shall also provide:

5.2.6.4.1. General architecture;

5.2.6.4.2. Equipment and cable layouts, including vehicle detection devices, both for junction traffic light equipment and LRT priority system;

5.2.6.4.3. Detailed junction design and traffic light settings, including design of priority for LRT in junctions, with calculation notes and safety checks, all with the approval of the MoT;

5.2.6.4.4. Micro-simulation of major junctions, as defined by the Company; and

5.2.6.4.5. Associated description and calculation notes

Specific and miscellaneous equipment

5.2.7. This may apply, as a result of the Preliminary Design, to specific fire-fighting networks, fire detection systems, pumping systems (for drainage and/or sewage networks), etc.

Depot and workshop

5.2.8. The Designer shall carry out the Detailed Design of the depot and workshop facilities and of its connection to the LRT line (including associated infrastructure and equipment).

5.2.9. The Designer shall provide:

5.2.9.1. A general site plan at a scale of 1:500;

5.2.9.2. Site plan views at a scale of 1:250 with the layout of track, road, structures, buildings, equipment, maintenance tools and any ancillary facilities;

5.2.9.3. Layouts and diagrams for track, track equipment, OCS, multi-tube cable ducts, structures, buildings, systems, OCC, internal building equipment, internal and external cables, etc., which shall show the same characteristics as indicated above for the corresponding components;

5.2.9.4. Site elevations and cross-sections at appropriate scale, at specific locations;
5.2.9.5. Architectural drawings (buildings, structural works, etc.) at appropriate scale, but no less than 1:50 for plans, elevations and cross-sections; and

5.2.9.6. Associated descriptions (including specific tools) and calculation notes.

**Rolling stock**

5.2.10. The Designer shall provide:

5.2.10.1. All documentation listed in paragraph 5.2.1 above;

5.2.10.2. Design records of the vehicle;

5.2.10.3. Prototype tests; and

5.2.10.4. Reliability, Availability, Maintainability and Safety (RAMS) documentation, including analyses of the critical modes of failure, safety documentation on the electrical distribution, doors, braking system, bogie, etc.

**Spare parts**

5.2.11. For both the M&E fixed equipment and the rolling stock and based on the RAMS studies carried out as aforesaid, the Designer shall provide a list of spare parts. The criteria relevant to each item shall be detailed.

**Operation and maintenance plans:**

5.2.12. The Designer shall detail the operational characteristics of the LRT line (in its first development stage), including:

5.2.12.1. Organization and human resources requirements;

5.2.12.2. Performance measurement and Key Performance Indicators (KPI's);

5.2.12.3. Description of the route (with branches, if any), with the position of stations/stops and any significant features, as well as any interoperability considerations with other transport lines.

5.2.12.4. Description of the normal operating service conditions, including:

5.2.12.4.1. Passenger loads at stations/stops, dwelling times, turn back times, regulation times, etc.;

5.2.12.4.2. Speed diagrams and the evaluation of the commercial speeds;
5.2.12.4.3. Types of services, headways and timetables (peak/off peak, pre-Shabbat, Shabbat and post-Shabbat situations);

5.2.12.4.4. Service starting and closing from/to the Depot (including pre-Shabbat, Shabbat and post-Shabbat situations), etc.;

5.2.12.4.5. Rolling stock fleet sizing; and

5.2.12.4.6. Energy consumption;

5.2.12.5. Description of the degraded operating modes;

5.2.12.6. Operational safety case.;

5.2.12.7. Health, safety and environmental requirements;

5.2.12.8. A principle maintenance plan providing and covering:

5.2.12.8.1. Asset management, including the expected repair and replacement schedules for the various systems, equipment, etc.;

5.2.12.8.2. The major maintenance access constraints;

5.2.12.8.3. The organization and planning of maintenance activities; and

5.2.12.8.4. Final handover/handback of the LRT system at the end of the concession period.

**Testing and commissioning program:**

5.2.13. The Designer shall provide the program and schedule of tests required up to the start of LRT commercial operation, including factory tests, sub-system and system tests, integration tests, safety specific tests, trial (shadow) running, etc.

**Security**

5.2.14. The Designer shall design according to the applicable security requirements and include in the tender documentation the design and specifications of the security requirements of the Company and applicable laws.

**Quantities and cost estimates:**

**Construction estimated costs**

5.2.15. The Designer shall:
5.2.15.1. Define accurately the various items to be measured during the execution of the works and thus to be priced in the applicable bills of quantities. The Company shall approve the format of the bills of quantities, which shall in any event identify at least the following:

5.2.15.1.1. Each phase of the works;

5.2.15.1.2. The appropriate geographical sections; and

5.2.15.1.3. Individually, each major item of structural work;

5.2.15.2. Provide a construction capital investment cost estimate based on its own (substantiated) cost estimate of each of the various items to be measured during the execution of the works; and

5.2.15.3. Provide an analysis of the evolution between the construction capital investment cost estimate based on the Detailed Design and the construction capital investment cost estimate based on the Preliminary Design.

**Operation and Maintenance costs**

5.2.16. Based on the operation and maintenance plans produced as aforesaid, the Designer shall provide its own (substantiated) annual operation, maintenance and life cycle cost estimates, over a period of thirty (30) years.

5.3. **Tender Process**

5.3.1. The Designer shall provide professional consultancy services during the Infra 2 Works tender process, including recommendations for answers to bidder's questions and updates of design deliverables, as required.

5.4. **Proposals Submission and Evaluation**

5.4.1. The Designer shall accompany the evaluation process of the bids and shall check the engineering submissions of the bidders, including participating in all necessary meetings and shall provide detailed evaluation reports, as required.

5.5. **Award of Contract**

5.5.1. During the period from announcement of preferred bidder until award of the tender, the Designer shall provide professional consultancy services, including recommendations for amendments to the concession contract and updates of design deliverables, as required.

6. **Supreme Supervision for Infra 1 Works**

Page 65 of 91
6.1. General

6.1.1. During the Infra 1 Works construction stages, the Designer shall perform the supreme supervision of the execution of the works, as an integral part of the planning and execution of the Project and as a significant component of the Project’s overall quality control and assurance system.

6.1.2. In performing and implementing the supervision tasks and responsibilities set forth below, the Designer and all applicable individual professional designers shall fully cooperate and coordinate with the Company’s technical advisers, including any foreign designers and consultants.

6.2. Purpose

6.2.1. The purpose of the supreme supervision is:

6.2.1.1. To provide guidance and clarification in respect of the design of the works;

6.2.1.2. To approve the contractors’ Method Statements;

6.2.1.3. To verify that the execution of the works conforms to and complies with the design of the works;

6.2.1.4. To respond to the contractors’ Requests for Information;

6.2.1.5. To authorize and undertake design changes, as required; and

6.2.1.6. To confirm conformance of the as-made documents with the actual design and execution of the works.

6.3. Construction Site Supervision Milestones

6.3.1. Construction site supervision shall be conducted on an on-going basis, throughout the entire construction period.

Commencement of the execution

6.3.2. Prior to a contractor, including subcontractors, commencing execution of the works, a kickoff meeting will be held with the participation of the contractor, the Company’s project manager (the supervisor), the Designer’s quality assurance manager, the Designer’s chief designer and the individual professional designer(s) relevant to the execution of the applicable works.

6.3.3. A kickoff meeting will be held each time prior to the start of a new discipline and prior to the start of a new work method that was not addressed in a previous kickoff meeting.

6.3.4. Each meeting will include the following activities by the Designer:

6.3.4.1. Presentation of the applicable design;
6.3.4.2. Presentation of any special points of emphasis for the execution of the applicable works;

6.3.4.3. Presentation of environmental and other constraints and considerations; and

6.3.4.4. Verifying that the applicable works execution documents in the contractor's possession are up-to-date and complete.

Authorization of the Method Statements (MOS) and materials

6.3.5. Before the execution of any new work, the contractor will be required to present its Method Statement, including the materials that it will be using.

6.3.6. The Designer, together with the Designer’s quality assurance manager, shall examine the contractor’s submission and authorize the Method Statement.

The course of the execution

6.3.7. The Designer shall undertake a construction site supervision visit at least once every week. In addition, the Designer shall participate in site inspections as required.

6.3.8. The applicable individual professional designer(s) engaged by the Designer shall conduct site inspections (including, as applicable, of production plants) based on milestones that shall be defined in the Designer’s quality control/assurance plan. As a minimum, such site inspections shall be conducted during the execution of the works pertaining to designs prepared by the individual professional designer(s). In addition, the individual professional designers shall participate in site inspections as required.

6.3.9. After each such site inspection, the applicable individual professional designer(s) shall issue a construction site supervision report and deliver it to the Company’s project manager, the Designer’s quality assurance manager, the Company and the applicable contractor.

6.3.10. The report shall include the applicable individual professional designer's opinion about the method of execution and comments on issues to be handled/corrected, as necessary. The report will be produced within two (2) workdays of the date of the site inspection.

6.3.11. The Designer’s quality assurance manager shall transmit to the applicable individual professional designer(s) all corrective-action documents for the approval of the applicable individual professional designer(s).

6.3.12. All reports and documents referred to above shall be collated by the Designer’s quality assurance manager in order to track the need for and implementation of corrective actions.

Request for Information (RFI)
6.3.13. The Designer shall respond to contractors’ Requests for Information (RFIs) within the shortest possible time.

**Changes to the design in the execution stage**

6.3.14. In every instance in which a change is required that affects the design of the Project, the Designer shall formulate/prepare the change, together with a report on the impact of the change on the quality, budget and time schedule of the Project.

6.3.15. To the extent that a change in the design is required in the works execution stage of the Project, the Company’s project manager will manage this process and the Designer shall not initiate or implement any change directly with any contractor.

**Completed execution and delivery of the Project**

6.3.16. The Designer shall participate in site inspections for the delivery of a piece of work upon its completion.

6.3.17. The Designer shall verify during the delivery site inspections that the applicable works were executed in accordance with the approved designs, that there were no deficiencies in the execution thereof and that any nonconformities opened in the quality control system were corrected to the Designer's satisfaction.

6.3.18. The Designer shall check and approve, in writing, conformance and compliance of the as-made documents with the approved designs and the works as executed.

7. **Supreme Supervision for Civil Work of Infra 2 Works**

7.1. The Infra 2 Works will be executed by a concessionaire (pursuant to the award of a tender) and will be divided into two components:

7.1.1. Civil works (laying of the track, multi-tubular, stations, electrification poles, etc.); and

7.1.2. System works (communications, control and electricity, including of the depot, procurement of rolling stock, etc.).

7.2. The Designer’s tasks and responsibilities in respect of supreme supervision, site inspections, reporting, etc shall be the same as for the Infra 1 Works (detailed above).
7.3. The detailed design for the system works will be prepared by the concessionaire in accordance with the requirements defined in the tender. Consequently, in addition to performing and implementing the same tasks and responsibilities as detailed above, the construction site supervision requirements shall (in addition) also include examination of the detailed design prepared by the concessionaire and assessment and confirmation of its compliance with the defined requirements, until final approval thereof.

7.4. In performing and implementing the aforesaid tasks and responsibilities, the Designer and all applicable individual professional designers shall fully cooperate and coordinate with the Company’s technical advisers, including any foreign designers and consultants and, in addition, shall fully coordinate, via the Company’s project manager, with all quality control and quality assurance personnel of the concessionaire.

8. **Combined Service Drawings**

8.1. For achieving a completed design that is fully coordinated with all interfacing parties, a complete integrated set of Combined Services Drawings (CSD) and Structural Electrical Mechanical Drawings (SEM) for overall design areas are required. This requirement is over and above the drawings and interface control documentation produced by the Designer as an interface lead and used as a tool to manage specific areas of interface. The Designer is responsible for collating and assimilating information produced by relevant interfacing parties into the complete integrated set of Combined Services Drawings (CSD) and Structural Electrical Mechanical (SEM) drawings.

8.2. Drawings shall specifically detail the requirements of all interfacing parties in relation to the design in terms of special arrangements, space allocation, cast-in items, primary and secondary fixings, grouting of equipment/plinths, drill and fix brackets and cast-in and surface-mounted conduits. These drawings shall also include composite cross-sections and layouts which show the spatial requirements of the supplier and all interfacing parties.

8.3. The CSDs will show the locations, routes and spatial relationships of the individual electrical and mechanical services and core system installations fully coordinated with each other and the structural work. These CSDs shall also clearly indicate that effective cable coordination has been achieved in terms of cable location or cable trays and the trunking and cable routing.

8.4. The SEMs will show all structural requirements for the electrical and mechanical services and the core system installations, including but not limited to openings, penetrations, sleeves, plinths, lifting beams and access panels.

8.5. Once sufficient data and information has been consolidated and relevant RFIs have been updated and satisfactorily closed, the Designer shall prepare and develop the CSDs and SEMs. Completed preliminary sets of CSD and SEM shall be circulated to all interface parties, who will thoroughly review, comment on and provide feedback to the Designer.
8.6. The Designer shall continuously update CSD and SEM drawings, which shall be revised and issued to relevant interfacing parties for further review and confirmation until all outstanding interface coordination issues have been resolved. The entire process of review, comment, feedback and discussion shall be repeated until the final set of properly coordinated and refined CSD & SEM are completed and submitted to the Company for approval.

9. **Design Management Process**

9.1. **Design Management Plan**

9.1.1. With twenty-eight (28) days of the commencement of the Project Designer Agreement, the Designer shall prepare a Design Management Plan and submit it to the Company for approval. The Designer shall not initiate or undertake any temporary or permanent design activities until the Design Management Plan is approved by the Company.

9.1.2. The Design Management Plan shall describe the design schedule, plans and procedures, responsibilities and accountabilities during the design process.

9.1.3. The Design Management Plan shall identify and schedule all design review procedures for all stages of the design process.

9.1.4. The Design Management Plan shall specify the process for closeout of review comments and for performing design checks of design calculations and drawings.

9.1.5. The Design Management Plan shall specify the process for managing assumptions and RFIIs, including their resolution and closure.

9.1.6. The Designer shall follow the Company’s design change control process for all design changes.

9.1.7. The Design Management Plan shall describe the Designer’s proposals and program for managing and coordinating the preparation of the designs for which it is responsible, which shall include, cover and comply with at least the following:

9.1.7.1. Identification of design teams with details of team leader and definitions and identification of core team members and other consultants. The Infra 1 Works design teams will be arranged in at least five (5) teams corresponding to the Project sections as defined by the Company. The core team will include at least a road and track (geometry) engineer, a structural engineer, a traffic engineer, a drainage and wet systems engineer and an electrical engineer. The team leader may be any of the core team members. The core team members will be appointed in one team only. The team leader will be an engineer with at least ten (10) years’ experience;
9.1.7.2. Identification of any consultants, sub-consultants and specialist sub-designers;

9.1.7.3. How the designs are to be broken down into discrete manageable design packages, for example, a sub-system, a bridge, or a section of permanent way;

9.1.7.4. The organization of the Designer, together with a description of how the design teams will be organized and which design teams will carry out which aspects of the design process;

9.1.7.5. The program and procedure for developing the designs through their various stages;

9.1.7.6. The program and procedure for ensuring design coordination across all disciplines; and

9.1.7.7. The program and procedure for obtaining review and approval of the designs by the Company.

9.1.8. The Designer shall update the Design Management Plan and summarize key issues in connection therewith in a monthly progress report to be submitted by it to the Company.

9.2. General Design Requirements

9.2.1. The Designer shall submit all designs prepared by it for review and approval by the Company.

9.2.2. The Designer shall also submit, for review by the Company, design compliance evidence, to verify its compliance with the requirements of this Annex B (Scope of Works).

9.2.3. The Designer shall provide all necessary design services and design deliverables, including but not limited to those listed below and those stated or stipulated in this Annex B (Scope of Works), including:

9.2.3.1. Production of designs including drawings, specifications, comprehensive design calculations clearly indexed and all other documentation necessary to justify and define the design;

9.2.3.2. Designer’s design checking, including checking calculations;

9.2.3.3. Document control, including version and revision control;

9.2.3.4. Correspondence;

9.2.3.5. Planning and minutes of meetings;

9.2.3.6. Requests for clarification and information from and to the Company and interfacing parties;
9.2.3.7. Design coordination and resolution;

9.2.3.8. Preparation and management of submittals;

9.2.3.9. Preparation and making of design presentations to the Company and stakeholders;

9.2.3.10. Scheduling;

9.2.3.11. Progress and status reporting;

9.2.3.12. Quality assurance and quality control;

9.2.3.13. Complete prototypes, mock-ups, samples, models and renderings as required by the Company and, in any event, as may be necessary or required for the proper design of the Project;

9.2.3.14. Participation in meetings as required and as requested by the Company;

9.2.3.15. Provision of design materials as required and as requested by the Company;

9.2.3.16. Provision of key design staff across all disciplines associated with the Project.

9.2.3.17. Undertaking of formal design reviews and appropriate checking of design packages, design calculations and as-built documentation; and

9.2.3.18. Incorporation and implementation of the Company’s comments and requirements.

The Designer

9.2.4. The Designer shall be led by an appropriately qualified and experienced design manager with relevant experience. The Designer shall select its teams and ensure that they are able to provide sufficient time and resources appropriate for the size and complexity of the Project, in terms of numbers, experience, skill and expertise. The Designer shall provide the names and contact information for key personnel in the design process. The Designer shall attend design reviews and other meetings, whenever requested by the Company.

9.2.5. The Designer shall produce designs that satisfy all of the Company’s requirements. The design deliverables shall include all design documents, drawings, plans, calculations and reports necessary to define the works that are to be constructed and/or installed pursuant to the designs prepared by the Designer.
9.2.6. The Designer shall ensure that all designs:

9.2.6.1. Deliver the required quality and durability;

9.2.6.2. Ensure safety during construction, operation and subsequent maintenance of the LRT line; and

9.2.6.3. Have been subject to detailed and documented risk assessment, with foreseeable risks identified and mitigated as far as practicable by design and any residual risks formally brought to the attention of and accepted by the Company. Where the Company does not accept such residual risks, the design shall be revisited and modified by the Designer as appropriate to remove any unacceptable residual risks.

9.2.7. The Designer shall issue a written progress report at the end of each month to the Company in accordance with the Company’s requirements. The format of the Designers’ monthly reports shall be agreed with the Company and include, as a minimum, the status of all designs worked on during the preceding month, targets for the next month and all other matters stipulated in this Annex B (Scope of Works) as requiring monthly reporting.

Design schedule

9.2.8. The Designer shall submit to the Company, for its review and approval, a design schedule for the submission of each design package in accordance with the Baseline Project Schedule and the Company’s requirements. The Designer shall maintain the approved design schedule throughout the implementation of the design and construction stages of the Project.

9.2.9. The Designer's monthly progress reports shall include the status of all design submissions, indicating both planned and actual submission dates, their review and response status, any delays in respect thereof and any significant issues in connection therewith.

9.2.10. The Designer's monthly progress reports shall also include the status of all assumptions, RFIs, design changes and compliance with the Company’s requirements.

Design checker

9.2.11. The Designer shall appoint a suitably qualified and experienced independent design checker. The design checker shall be familiar with projects of this size and complexity.
9.2.12. The design checker shall undertake design checks on all Detailed Designs prepared by the Designer, including drawings, plans, calculations and reports produced by the Designer. The design checking process shall be undertaken prior to issuing submittals to the Company. The design checker shall carry out independent analyses and calculations to verify the adequacy of the Detailed Designs and to confirm compliance with the Company’s requirements.

9.2.13. The Designer shall provide the Company with full and unrestricted access to the design checker and to all his/her data, information, calculations, drawings and records.

9.2.14. The design checker shall issue a written report at the end of each check to the Designer with a copy to the Company. The Designer shall agree on the format of the design checker’s reports with the Company.

Design quality

9.2.15. The designs prepare by the Designer shall adhere to all applicable Israeli laws and regulations and to all applicable codes, standards and quality control procedures. The Designer shall ensure that the designs and the design deliverables, as a minimum, are:

9.2.15.1. Complete and provided in English;

9.2.15.2. Compliant with the Company's requirements;

9.2.15.3. Clearly marked with version and revision references, including traceability for any changes from the previous version or revision;

9.2.15.4. Accurate, with dimensions of all major features, elements and members;

9.2.15.5. Legible;

9.2.15.6. Understandable;

9.2.15.7. Constructible;

9.2.15.8. Comprehensive;

9.2.15.9. Fit for purpose; and

9.2.15.10. Approved by the Independent Safety Assessor (ISA).

Design packages

9.2.16. Design packages are required to describe subdivisions of the design according to discrete sets of elements, to facilitate the development, review and understanding of the design in its entirety.
9.2.17. Design packages shall provide complete information of all disciplines of system or subsystem (as applicable). For example, civil engineering, structures, bridges, signaling, power, ticketing and permanent way drawings would each be a separate design package. The breakdown of the design into design packages shall be prepared and submitted by the Designer for the approval of the Company as part of the submission of milestone 1.1 (Preliminary Design stage, Design Standards and Criteria).

9.3. **Project Reviews and Reporting**

**General provisions**

9.3.1. Review by the Company of the Designer’s work progress shall take place periodically over the course of the Project.

9.3.2. The Company shall monitor the Designer’s work through the LAHAV team and the Designer shall be available (as required by the Company) to discuss the progress and content of its work, on a continuing, cooperative basis.

**Design reviews**

9.3.3. The Designer’s responsibilities with respect to the Company’s design reviews shall be:

9.3.3.1. Preparation and submission of appropriate design documentation;

9.3.3.2. Attendance at all design review meetings and ensuring appropriate participation; and

9.3.3.3. Integration of any requirements arising from the Company’s review of the applicable design.

**Progress reviews**

9.3.4. As part of, or in addition to design review meetings, the Designer shall participate in regular monthly progress review meetings with the Company and the LAHAV team and with third parties (as and when required), to discuss technical, scheduling and other management and administrative issues in connection with the Project.

**Progress reports**

9.3.5. The monthly progress reports shall (in addition to any other matters which they are required to address/contain) address the following issues:

9.3.5.1. Contractual schedule updates, reflecting progress with each work task;
9.3.5.2. Concerns and/or decisions required which may affect the Project and/or the contractual schedule; and

9.3.5.3. Explanations for any variances from the contractual schedule and presentation of recovery plans to bring those activities back on schedule.

9.3.6. All text and associated material shall be produced on MS Office software (latest version).

Presentations

9.3.7. The Designer shall be responsible for the preparation of materials and the presentation to the Company and any other third parties of information in connection with the Project, as requested by the Company.

9.3.8. Presentations and display boards shall be produced on MS Office software (latest version).

9.3.9. One (1) electronic copy of all presentations shall be provided to the Company following presentation thereof.

Company’s design review process

9.3.10. The Designer shall follow the process below for the submission of each design package. Each design package shall follow the process below for and in respect of each of Stages 1 to 5, as such stages are defined below.

9.3.11. **Initiate Submission** – Issue a design review meeting agenda and meeting request to the Company defining the scope of the design to be reviewed and the stakeholders required to participate. The applicable design package shall be baselined and submitted to the Company together with the agenda.

9.3.12. **Design Package Initial Review** – The Company and identified stakeholders shall review the applicable design package and provide comments to the Designer. The Designer shall review all feedback provided and have an opportunity to address comments prior to the design review meeting.

9.3.13. **Design Package Formal Presentation** – The Designer shall provide a formal technical briefing to the Company and other participants at a design review meeting arranged for that purpose.

9.3.14. **Design Package Formal Review** – The Designer shall consider and respond to comments raised (if any) during the design review meeting. Subsequently, the Designer shall hold a follow-up meeting with the Company to address comments, responses, actions and any outstanding technical issues, before the applicable design package may progress to the next Stage.
9.3.15. In order to progress to the next Stage all comments must be addressed, all issues must be resolved and all required actions must be completed. Any changes made to a reviewed design package shall be verified by the Company and documented. A certificate will be issued by the Company to the Designer indicating successful completion of each Stage of the development of a design package.

9.3.16. The Designer shall upload all design package submission documentation, including responses to comments, to the Company provided Electronic Document Management System (EDMS), or another system as advised by the Company, to facilitate the collection, sorting, publication and administration of the design package submissions.

**Internal reviews**

9.3.17. In addition to and notwithstanding any Company reviews, the Designer shall perform all internal reviews, checks and verifications as are necessary and required to ensure that the designs prepared by it are fully and properly compliant with the Company’s requirements, including this Annex B (Scope of Works).

**Designer’s Requests for Information**

9.3.18. The Designer shall send any Requests for Information (RFI) to the Company, in digital and hardcopy format, containing complete details of the design query.

9.3.19. The RFIs shall include accompanying explanatory documents, all such drawings, extracts from drawings, specifications and other documentation as are necessary to understand the issue at hand fully without having to refer to other documentation. The RFI shall clearly explain the issue, suggest a resolution to the particular issue and provide a proposed date for the response.

9.3.20. Each RFI shall be allocated a unique sequential reference number by the Designer. The Designer shall maintain a central log on Microsoft SharePoint and, in each monthly progress report, inform the Company of all RFIs generated and their status.

9.3.21. The Designer shall summarize and report on the progress of RFIs in each monthly progress report.

9.4. **Designer’s Design Package Submission Process**

9.4.1. The Designer shall collaborate with interfacing parties to develop the design and submit design packages through a five-stage design process, as described below.
9.4.2. The Designer shall review the Reference Design and shall prepare a staged design package submission process. The Designer shall ensure that each design package submission is baselined and fully compliant with the Company’s requirements and design management processes.

9.4.3. That process shall include, as a minimum, design submissions and reviews, design coordination, system integration and liaison with third parties, including but not limited to municipalities, utility providers, the Company’s other advisers and suppliers and relevant authorities with jurisdiction or responsibility for approvals, permits and/or consents.

9.4.4. The Designer shall ensure that the design deliverables meet all requirements of the Project Designer Agreement and shall provide suitable design compliance evidence to the Company. The Designer shall allow access for the Company’s representatives to review all documents prepared throughout all stages of the implementation of Project Designer Agreement.

9.4.5. The Designer shall provide and maintain a complete list of configurable items (CIs).

**Design package stages**

9.4.6. The Designer shall submit, for review and approval by the Company, design packages that are fully compliant with the Company’s requirements, including this Annex B (Scope of Works).

9.4.7. The following five (5) Stages describe the design package submission stages:

*During Preliminary and Final Level Design Stage:*

**Stage 1:** Initial design packages providing the design solution.

**Stage 2:** Coordinated design packages.

*During the Detailed Design Stage:*

**Stage 3:** Technical design packages providing the Detailed Design.

**Stage 4:** Construction design packages providing the construction drawings, shop drawings and installation drawings.

*During Construction:*

**Stage 5:** Supervision and as-built design packages providing the as-built drawings.

**Stage 1: Initial Design Packages (Preliminary Design Stage)**

9.4.8. The Designer shall review the Reference Design in accordance herewith.
9.4.9. The Designer shall notify the Company promptly upon any ambiguity or discrepancy becoming apparent in or between the Reference Design, the Company’s requirements and/or any technical specification for the Project.

9.4.10. The purpose of this submission for a given design package is to:

9.4.10.1. Provide a design solution (not a detailed design) that, following review and approval by the Company, will subsequently be developed into a coordinated and Detailed Design;

9.4.10.2. Set the basis of design (design criteria, standards, codes, etc. that the Detailed Design will comply with); and

9.4.10.3. Submit the design solution for review and approval by the Company.

9.4.11. Each Stage 1 submission shall include:

9.4.11.1. Design package containing only one (1), or part of one (1), subsystem (such as civil, bridges, signalling, power, ticketing, permanent way, etc.);

9.4.11.2. Design package that contains, as a minimum, a full set of general arrangement drawings, which demonstrates the complete design solution and is suitable for Stage 2 coordination;

9.4.11.3. Assumptions documented within the Assumptions Log;

9.4.11.4. Preliminary design reports;

9.4.11.5. Designer’s design certificate(s) listing all the drawings and outline specifications that define the design solution, signed by the Designer and confirming that the design solution in the Stage 1 submission conforms to the Company’s requirements and all applicable technical specifications and that the solution is submitted for review by the Company;

9.4.11.6. Initial design compliance evidence and the aforesaid design certificate(s) referenced by the Designer against the applicable requirements within the Company’s Requirements Management System (RMS); and

9.4.11.7. Approval of the Independent Safety Assessor (ISA).

Stage 2: Coordinated Design Packages (Final Design Stage)

9.4.12. The Designer shall submit Stage 2 design packages and drawings following coordination with other disciplines, systems, interfaces and consent information.

9.4.13. The purpose of this submission for a given design package is to:
9.4.13.1. Identify all other works that interface with the works in the applicable design package;

9.4.13.2. Provide a coordinated design solution (not a detailed design) that, following review and approval by the Company, will subsequently be developed into a Detailed Design; and

9.4.13.3. Submit the coordinated design solution for review and approval by the Company.

9.4.14. Each Stage 2 submission shall include:

9.4.14.1. Design package containing only one (1), or part of one (1), subsystem (such as civil, bridges, signalling, power, ticketing, permanent way, etc.); each package shall be a development of the Stage 1 design solution and, upon approval by the Company, the starting point for the Stage 3 Technical Design;

9.4.14.2. Confirmation that the Stage 1 design solution has been developed to coordinate with all interfacing works and their designs; the submission shall contain all revised drawings where modifications to the Stage 1 designs have been made to ensure a fully coordinated and integrated design;

9.4.14.3. Coordinated design package that contains, as a minimum, a full set of updated general arrangement drawings, sections, elevations and details that demonstrate a coordinated design integrated with all the designs of interfacing parties, systems and subsystems and is suitable for Stage 3 Technical Design;

9.4.14.4. Assumptions documented within the Assumptions Log;

9.4.14.5. Designer’s design certificate(s) listing all the drawings and outline specifications that define the coordinated and integrated design solution, signed by the Designer and confirming that the design solution in the Stage 2 submission will not only comply with and deliver the Company’s requirements, but is also a design that is fully coordinated and integrated with all applicable interfaces, technical specifications, systems and subsystems and that the solution is submitted for review by the Company;

9.4.14.6. Updated design compliance evidence and the aforesaid design certificate(s) referenced by the Designer against the applicable requirements within the Company’s RMS; and


Stage 3: Technical Design Packages – Detailed Design

9.4.15. The Designer shall submit Stage 3 design packages and drawings developed from Stage 2 coordinated design packages.
9.4.16. The purpose of this submission for a given design package is to:

9.4.16.1. Provide a Detailed Design solution comprising drawings and documents, which together constitute a fully defined coordinated Detailed Design for the applicable works and which, following review and approval by the Company, will be subsequently developed into construction drawings; and

9.4.16.2. Submit the Detailed Design for review and approval by the Company.

9.4.17. Each Stage 3 submission shall include:

9.4.17.1. Development of the Stage 2 Coordinated Design Package;

9.4.17.2. Design package containing only one (1), or part of one (1), sub-system (such as civil, bridges, signalling, power, track and alignment, ticketing, permanent way, etc.);

9.4.17.3. Coordinated and integrated Detailed Design solution, comprising a full set of not only general arrangement drawings (including plans, sections, elevations and details which demonstrate a coordinated design integrated with interfacing parties, systems and sub-systems), but also all other required design drawings and specifications which together fully and unambiguously define the coordinated and integrated design and the applicable works;

9.4.17.4. A complete, fully detailed, coordinated and integrated design; the Detailed Design package shall include fully dimensioned drawings, specifications, comprehensive design calculations that are clearly legible and indexed and all other documentation necessary to justify and define the design; the design package shall provide all details, test data, reports, samples or images and any other information required to define, illustrate and justify the Detailed Design; and appropriate references shall be documented and maintained against the applicable contractual requirements to demonstrate compliance within the Company’s RMS;

9.4.17.5. Where the design is predicated upon an assumed construction sequence, or any other assumption, the assumption shall be documented within the Assumptions Log;

9.4.17.6. The required step-by-step sequence that the construction of the works is to follow, shown unambiguously on drawings prepared by the Designer;
9.4.17.7. Where necessary, diversion plans for utilities, traffic and pedestrians, ground investigation and settlement analyses, monitoring and reinstatement proposals, specifications, materials, samples, mock-ups and prototypes;

9.4.17.8. Where necessary, reports and/or documentation that support and/or justify the design, such as, but not limited to, topographical surveys, site investigation reports and site or field surveys;

9.4.17.9. Designer’s design certificate(s) confirming the design and calculations were independently checked and certified by the Designer’s design checker;

9.4.17.10. Fully coordinated and integrated design delivering all relevant Company’s requirements applicable to the design in question;

9.4.17.11. Starting point for the development of the Stage 4 Construction Design Package; and

9.4.17.12. Design certificate(s):

9.4.17.12.1. Listing all the drawings and specifications which unambiguously define the coordinated and integrated Detailed Design, referenced by the Designer against the applicable requirements within the Company’s RMS; and

9.4.17.12.2. Signed by both the Designer and the Designer’s design checker confirming that the Stage 3 design meets all the Company’s requirements, complies with all the relevant laws, regulations, standards and codes and is fully coordinated and integrated with all applicable technical specifications, systems and subsystems and that the design is submitted for review by the Company; and


9.4.18. Depending upon the works, additional technical design packages may be required, including the following submissions:

9.4.18.1. Full-size mockups and/or prototypes, as follows:

9.4.18.1.1. The Designer shall produce, where required, full-size mockups and/or prototypes that are fully compliant with the Company’s requirements; and
9.4.18.1.2. The Designer shall submit full-size mockups, where required, to a secure location, for a pre- agreed term, in advance of any related procurement, construction or installation activities; and/or

9.4.18.2. Alternative products and materials, as follows:

9.4.18.2.1. Where the Designer proposes the use of alternative products and materials, it shall submit a proposal;

9.4.18.2.2. The proposal shall include the reason(s) for requesting the variation, full product data for the alternative products and materials and the manufacturer’s name, type-test and testing reports, catalogue number, trade name and appropriate scale and size of samples or mock-ups;

9.4.18.2.3. Where the Designer proposes alternative products or materials (including equipment), the Company has no obligation to accept them; and

9.4.18.2.4. The Designer shall be responsible for proving equivalency and provide either manufacturer’s documentation or an independent testing laboratory report confirming that the proposed alternative product or material meets or exceeds the Company’s requirements (including any applicable technical specifications).

Stage 4: Construction Design Packages

9.4.19. The Designer shall submit Stage 4 Construction Design Packages and drawings that were developed from the Stage 3 Technical Design Package.

9.4.20. The purpose of this submission for a given design package is to:

9.4.20.1. Provide the Company with tender documents for tender publication;

9.4.20.2. Provide the final construction and/or installation and/or shop and/or fabrication drawings and/or detailed reinforcement drawings and schedules and associated specifications drawings, which comply wholly with the Stage 3 Detailed Design solution; and
9.4.20.3. Submit the final construction and/or installation and/or shop and/or fabrication drawings and/or detailed reinforcement drawings and schedules and associated specifications drawings for review and approval by the Company.

9.4.21. The Designer shall submit drawings that are suitable for construction and shall:

9.4.21.1. Provide the level of detail necessary to construct the applicable design package, including among other things drawings, specifications and method statements;

9.4.21.2. Define the composition of any material, part, component, sub-assembly or assembly, at any level, in terms of subordinate part numbers, either on the part drawing or on a utilization record tabulation.

9.4.21.3. Provide the specification requirements, industry standard, specification control drawings, source control drawings, part numbers, or an assembly reference code provided by a sub-designer or supplier of the Designer.

9.4.21.4. Identify and describe engineering design changes that were previously approved by the Company and retain records of superseded configuration requirements affecting any material, part, component, subassembly or assembly.

9.4.21.5. Identify various components, parts, sub-assemblies and assemblies with a unique numbering system.

9.4.21.6. Demonstrate that each part number used by its sub-designer or supplier identifies a specific item in a specific configuration; changes to a component part number shall require a part number change in the next higher level of assembly.

9.4.21.7. Ensure all items of duplicated systems have the same physical and functional characteristics, are equivalent in performance and durability and are interchangeable without alteration to themselves, other than field installation adjustments which are a part of each installation procedure; and

9.4.21.8. Demonstrate that a component is interchangeable and can achieve the specified performance criteria.

9.4.22. Each Stage 4 submission shall include:

9.4.22.1. Development of the Stage 3 Technical Design Package Solution;
9.4.22.2. The full final set of construction and/or installation drawings, comprising not only general arrangement drawings (including plans, sections, elevations and details that demonstrate a coordinated design integrated with interfacing parties, systems and sub-systems), but also all other required drawings and associated specifications, including but not limited to shop and/or fabrication drawings and/or detailed reinforcement drawings and corresponding detailed bar bending schedules and associated specifications, which together fully and unambiguously define not only the coordinated and integrated design, but also the construction and/or installation of the applicable works;

9.4.22.3. Assumptions documented within the Assumptions Log;

9.4.22.4. Certification by the Designer’s design checker that the applicable design is compliant with the Company’s requirements, including this Annex B (Scope of Works);

9.4.22.5. Starting points for the development of Stage 5 As-Built Design Package;

9.4.22.6. The Designer’s and the Designer’s design checker’s confirmation that the Stage 4 design meets all the Company’s requirements, is a fully coordinated and integrated design and complies with all the relevant laws, regulations, standards and codes;

9.4.22.7. Designer’s design certificate(s) confirming that the submitted design coordinates, interfaces and integrates with all applicable technical specifications, systems and subsystems;

9.4.22.8. Updated design compliance evidence;

9.4.22.9. The aforesaid design certificate(s) referenced by the Designer against the applicable requirements within the Company’s RMS; and

9.4.22.10. Approval of the Independent Safety Assessor (ISA).

**Design Change**

9.4.23. Whenever the Designer wishes to amend a design that has already been reviewed by the Company, the Designer shall submit the amendment for review via the Company’s change control process.

9.4.24. Depending on the scope of the change, the Designer shall submit the proposed change for review and approval by the Company in accordance with Stages 1 to 4 above, but in any event as a minimum in accordance with Stages 3 and 4 above.
Stage 5: As-Built Design Packages

9.4.25. The purpose of this submission for a given design package is to:

9.4.25.1. Provide supervision reports throughout construction of the Project;

9.4.25.2. Provide the final construction and/or installation and/or shop and/or fabrication drawings and/or detailed reinforcement drawings and schedules and associated specifications drawings, updated to incorporate any and all changes made during construction in order to give a complete, accurate and true record of the works as executed; and

9.4.25.3. Obtain review and approval of the submission by the Company.

9.4.26. The Designer shall submit drawings that record the final construction and shall maintain construction and installation records such that the configuration of any item delivered, installed or constructed shall be identifiable in terms of its component part numbers.

9.4.27. The Designer shall document the "as-built" configuration of all aspects of the works in detailed drawings, documents, notes and other descriptive material, as follows:

9.4.27.1. Where the Designer proposes to make any on-site changes or deviations from the approved construction drawings, the Designer shall follow the Company’s change control process and, once approved, shall cross-reference the change to the works to the change approval, via the addition of a revision cloud and RFI reference (if applicable) on the relevant as-built drawings.

9.4.28. Each Stage 5 submission shall include:

9.4.28.1. Consolidated, organized, catalogued, and complete set of “as-built” documents, recording changes and the reasons for any changes (referring to change control documentation, any applicable RFIs or other correspondence) from Stage 4 drawings;

9.4.28.2. Design package containing only one (1), or part of one (1), subsystem (such as civil, bridges, signalling, power, ticketing, permanent way, etc);
9.4.28.3. Complete and fully detailed, coordinated and integrated set of construction drawings, including not only general arrangement drawings, sections, elevations, details and specifications, but also the reinforcement drawings, fabrication drawings, installation drawings, shop drawings and all drawings used to construct and install the applicable works, which together fully define the coordinated and constructed and/or installed works;

9.4.28.4. Final Assumptions Log and RFI Log with all assumptions resolved and RFIs completed;

9.4.28.5. “As-built” design packages certified by the Designer as conforming to all the Company’s requirements, including this Annex B (Scope of Works);

9.4.28.6. Designer’s design certificate(s) that certify the completion of Stage 5 As-Built Design Package coordination and that the applicable “as-built” documentation is a complete, accurate and true record of the construction and installation of the applicable works and their coordination and integration with all interfacing systems; it shall also certify that the submission contains those drawings where modifications to the Stage 4 designs were necessary to ensure a fully coordinated and integrated construction;

9.4.28.7. Updated design compliance evidence; and

9.4.28.8. The aforesaid design certificate(s) referenced by the Designer against the applicable requirements within the Company’s RMS.

9.4.29. The Designer shall provide one (1) reproducible master and two (2) hard copies of all “as-built” drawings, one (1) copy on CD/media and two (2) printed copies.

Format and Number of Copies

9.4.30. The Designer shall submit one (1) original and two (2) identical hard copies of the baselined design packages and an electronic copy via the EDMS – a system that allows storage of data and file transmission. The electronic copy shall be indexed appropriately to provide ease of navigation by the Company.

9.4.31. The design packages shall include drawings in both full format (A0) and A3 size (refer to the applicable CAD requirements).

9.4.32. Transmittals shall accompany each design package submission with, as a minimum:

9.4.32.1. Document description and number;
9.4.32.2. Version/revision number;
9.4.32.3. Number of copies submitted;
9.4.32.4. Date of submission and delivery to the Company; and
9.4.32.5. Signed Designer’s design certificate(s) (as aforesaid).

9.4.33. In addition, the Designer shall submit electronic files directly to the Company using the Company provided EDMS, or another system as advised by the Company.

9.4.34. When electronic files exceed limits defined by the Company, the Designer shall upload these larger files to the Company’s secure web access site.

9.4.35. The Designer shall enclose signed Designer’s design certificates together with any electronic file submission.

9.5. The Company’s Review

General

9.5.1. For design packages to be submitted for review by the Company, the provisions herein define the respective responsibilities of the Company and the Designer pursuant to such review.

9.5.2. The Company may reject any design submission if a cursory evaluation by the Company indicates it is not suitable for a full review and does not meet the Company’s requirements and/or any applicable technical specifications. The Company will respond to the Designer within twenty-eight (28) days of receipt of each submittal. The Company shall provide comments in the agreed computerized database format or via other methods, which may include marking of review documents, comment sheets and/or use of electronic files.

9.5.3. The Company does not warrant by its review of any design submission that the information on or contained in the deliverables is accurate or complete. The review of a design submission by the Company shall not place any responsibility or liability on the Company, nor shall it relieve the Designer of any of his obligations or responsibilities and the sole responsibility and obligation for all aspects of the design shall remain with the Designer.

The Company’s responses

9.5.4. The Company shall forward to the Designer, within twenty-eight (28) days of receipt of a design submission, a response in accordance with the following:
9.5.4.1. The Company will assign a category (SONO, SONOWC, SOC or SOR) to the Designer's documents and design package that have been submitted for review. The categories have the meanings listed below; and

9.5.4.2. The Company does not warrant by its commenting, failure to comment and/or approval that the information on or contained the deliverables is accurate or complete. The commenting, failure to comment and/or approval by the Company shall not place any responsibility or liability on the Company, nor shall it relieve the Designer of any of his obligations or responsibilities and the sole responsibility and obligation for all aspects of the design shall remain with the Designer.

Table 1: Review Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category NC: Statement of No Comments (SONO)</td>
<td>Where the Company has no comments following review of a submittal, the Company shall notify the Designer. A NC shall not relieve the Designer of its responsibilities and obligations. A NC shall permit the Designer to progress the activities associated with the submittal.</td>
</tr>
<tr>
<td>Category MC: Statement of Minor Comments</td>
<td>The Company may provide to the Designer comments on the submittal in its current form, which do not require a change in the submittal at its current stage, but which the Company considers should be taken into account in future development of the subject of the submittal. In its response to the review, the Designer shall advise how such comments are to be addressed. A MC shall not relieve the Designer of its responsibilities and obligations. A MC shall permit the Designer to progress the activities associated with the submittal.</td>
</tr>
<tr>
<td>Category C: Statement of Comments</td>
<td>The Company may provide to the Designer comments including reason(s) why the submittal in its current form does not comply with one or more of the Company’s requirements (including applicable technical specifications). Such comments shall be addressed by resubmission of the submittal at the current stage before development of the subject of the submittal going forward. In its response to the review, the Designer shall advise which elements of the current submittal it intends to resubmit. No request or requirement for resubmission shall be grounds for an extension of time. For category C, the Designer shall re-submit within thirty (30) days of receiving comments from the Company. If the Company does not provide any comments within thirty (30) days thereafter, the Designer shall consider the re-submitted submittal as SONO. Neither a C nor a deemed SONO shall relieve the Designer of its responsibilities and obligations. A deemed SONO shall permit the Designer to progress the activities associated with the submittal.</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
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<tr>
<td><strong>Category SOR: Statement of Rejection</strong></td>
<td>The Company may reject any submission if according to its evaluation it is not suitable for review. The submission will not be reviewed and the Designer will not be entitled to any payment pursuant to any milestone or interim payment applicable thereto. A SOR shall not relieve the Designer of its responsibilities and obligations. A SOR shall not permit the Designer to progress the activities associated with the submittal.</td>
</tr>
</tbody>
</table>

9.6. **Content of Deliverables**

9.6.1. In addition to the details above, the content required for deliverables for each discipline at each design stage are arranged in the following files, attached as Appendix D hereto.

9.6.1.1. Civil engineering deliverables:

- Preliminary Design Stage - CIH_SD Design Content.
- Final Design Stage - CIH_PD Design Content.
- Detailed Design Stage - CIH_DD Design Content.

The above documents are in Hebrew.

9.6.1.2. Railway systems design deliverables:

- Design Tasks and deliverables for railway Systems (Infra 2) by NTA.
- Design Tasks and deliverables for Underground Stations.

The documents are in Hebrew.

9.6.2. The Designer shall note:

9.6.2.1. Where the above guidelines refer to NTA, it should be read as referring to the Company;

9.6.2.2. The cross link table with the matching of responsibilities and design stage between the above guidelines and this Annex B (Scope of Works) is attached as Appendix D1 hereto; and

9.6.2.3. The Designer will disregard the parts related to the underground structure works and implement the design tasks and deliverables in the design of stations/stops.
9.7. **The Company’s CAD Guidelines**

9.7.1. The Designer shall prepare submissions in accordance with the Company’s CAD Guidelines, which include, as a minimum:

9.7.1.1. General CAD Guidelines;

9.7.1.2. Layer properties for AutoCAD drawings;

9.7.1.3. Guidelines for file name registration; and

9.7.1.4. Guidelines for completing the Company’s title boxes.

9.7.2. Where the Designer finds that the CAD Standards Manual does not suffice, it shall alert the Company and propose the required additions or changes all in accordance with the Company general requirements.

9.8. **The Company’s Reference Design**

9.8.1. The Company’s Reference Design is as provided in:

9.8.1.1. The Company’s “General Requirements for Submission of Design Packages” (CIH procedures – Design Content);

9.8.1.2. Reference design prepared by Yefe Nof, which part of the Reference Documents attached to the Invitation to Bid; and

9.8.1.3. Design Criteria, Standards and Codes in Appendix C hereto.

9.8.2. The Designer shall also take note of the design guidelines prepared as part of the reference design of Yefe Nof. These guidelines are provisional and the Designer shall assess them during Stage 1 – Preliminary Design Packages Submission.

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