ENVIRONMENTAL IMPACT ASSESSMENT

Proposed 14 Storey Building Construction in MA. Manaage, Male'

Proponent:

Rainbow Construction Pvt. Ltd.

Consultant:

Amir Musthafa (EIA01/13)

October 2015

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Consultants Declaration

This EIA has been prepared according to the EIA Regulations 2012. I certify that the statements in this Environmental Impact Assessment study are true, complete and correct to the best of my knowledge and abilities

Amir Musthafa (EIA 01/13)

12th October 2015

Proponents Declaration

(attached in the following page)

بسم الله الرحمن الرحيم

RAINBOW
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RC/LTT/2015/115

Yazeed Ahmed
Director
Environmental Protection Agency
Ministry of Environment and Energy
Male', Maldives

7th October 2015

Dear Mr. Yazeed Ahmed,

Project: EIA for the proposed 14 Storey Building Construction in MA. Manaage

Sub: Proponents Declaration

As the proponent of the project, we guarantee that we have read this EIA report and to the best of our knowledge, all non-technical information provided here are accurate and complete. We are aware that this report has been prepared in accordance with the EIA regulations.

Thanking you

Yours Sincerely

Mazin Rafeeq

Director

RAINBOW CONSTRUCTION PVT LTD. C-275/2002

Non Technical Summary

This report is based on the proposed 14 storey building construction at the residence, Ma. Manaage in the capital city, Male'. The project is being developed and constructed by Rainbow Construction Pvt. Ltd. to undertake the construction works and project management including overseeing the EIA process.

An Environmental Impact Assessment was necessary for the works outlined in this report as they fall under 'Jadhuvalu R' of the Environmental Impact Assessment Regulations 2012 of the Maldives. In addition to meeting the regulatory requirements, the report would further assist the proponent and important stakeholders to make decisions based on favourable environmental conditions with the main focus on sustainability. The project also adheres to several other rules and regulations in the Maldives and has obtained permit from the Male' city council for the project to proceed.

The area the project is proposed to be undertaken is a moderately built area in the heart of Male', more towards the western side. There is no natural terrestrial environment at site, although there are some roadside vegetation in the area. The existing environment therefore was focussed on the regional climate of Male', and the traffic distribution, and noise pollution in the area. As could be seen from the data, this area does not encourage much traffic relative to the busier roads in Male'. A general exterior overview of the existing structures in the area was also observed. It was found that most of the buildings in the area were in good condition. Older buildings were mostly single storey structures. Therefore, serious structural defects are expected to be at a minimum. However, the report recommends to undertake a structural defects inspection study of the buildings in the same block as the proposed site by civil engineering experts.

The overall environmental impacts of the project have been assessed using frameworks found in literature. Since the development is undertaken in a moderately built area, the results indicate that the proposed project has neutral impact. However, there are some significant impacts on the environment during the construction phase of the project and these needs to be mitigated to avoid any significant damage to the environment. Significance of the impacts and mitigation measures have been provided based on previous similar projects undertaken in the Maldivian environment and based on literature.

The main cause for concern regarding this project is the impact it will have on neighbours residing in this area. As such, several short-term impacts are envisaged including air pollution, noise pollution, aesthetic impacts, and safety concerns. As there are numerous high storey building projects being undertaken in Male', there is no particular long term impact associated with this project. One significant impact specific to this project is impact

on the roadside vegetation during transportation of machinery and equipment. The impacts that do occur however can be easily mitigated to minimise and/or completely nullify them. The first mitigation measure proposed includes creating awareness among the construction staff and neighbours regarding the scope of the project. Other measures include taking protective measures to ensure people residing and utilising the vicinity will not have to endure the impacts during the construction stage. Foundation protection measures are recommended and are provided as part of the project to prevent impact on neighbouring structures in addition to a 1m offset from the adjacent building. Dewatering procedure also needs to be undertaken with care, details of which are given in the report. Care should also be taken to prevent any damage to the vegetation on the road during transport of machinery and equipment.

Alternatives, including the no project option and alternatives for some project components are also discussed. Regarding project design, a few alternatives are recommended for the swimming pool, provide a green area at the terrace, while the pros and cons of making a larger parking area is also discussed.

An environmental monitoring program is provided at the end of the report, which provides details on the parameters to monitor on site, and the frequency in which it needs to be done. Estimated costs for the monitoring works are given. Implementation of the program is essential for the sustainable development of the project.

In conclusion, it is discussed the impact such major housing projects have for the increasing population density in Male', and how it can be prevented at a policy level. However, taking this project as a standalone development project in an already heavily built island city, it can be concluded that no significant long-term impacts are predicted. Therefore, it is recommended that the project go ahead as proposed with precautions and mitigation measures in place.

ސާރާ ޚުލާސާ

މި ރިޕޯޓަކީ މާލެ، މައްޗަންގޮޅި މަނާގެ ގޯއްޗަށް 14 ބުރީގެ އިމާރާތެއް ހެދުމުގެ މަޝްރޫޢަށް ބިނާކޮށް ތައްޔާރު ކުރެވިފައިވާ ރިޕޯޓެކެވެ. ތިމާވެށްޓަށް އަސަރު ކުރާނެ މިންވަރު ބަލާނެކުރާ ރިޕޯޓް ނުވަތަ 'އީ.އައި.އޭ' މި މަޝްރޫޢަށް ހަދަން ޖެހިފައިވަނީ މިމަޝްރޫޢަކީ ތިމާވެށްޓަށް އަސަރު ކުރާނެ މިންވަރު ބަލާނެކުރާ ރިޕޯޓު ހެދުމާއި ބެހޭ ގަވާއިދު 2012 ގެ 'ޑީ' ޝެޑިއުލް ދަށުގައި މިފަދަ ރިޕޯޓު ހަދަންޖެހޭ މަޝްރޫޢުގެ ލިސްޓުގައި މިމަޝްރޫޢުގައި ހިމެނޭ މަސައްކަތްތަކެއް އެކުލެވިގެންވާތީއެވެ. މިމަޝްރޫޢު ތިމާވެށްޓާއިބެހޭ ގަވާއިދާއި ޤާނޫނަށް ފުރިހަމަކުރުމުގެ އިތުރުން، މި އީ.އައި.އޭގެ ސަބަބުން މިމަޝްރޫޢުގެ އެދިޔާރަކާއި ކަމާބެހޭ އެހެން ފަރާތްތަކަށް މަޝްރޫޢާއި ބެހޭ ނިންމުންތައް ނިންމުމަށް އެހީ އަކަށް ވެދެވޭނެއެވެ. އަދި ދުވެލިކުރުމެއްނެތި ގޮތަކަށް މިމަޝްރޫޢު ކުރިއަށް ގެންދިއުމަށް އޮތް ފަސޭހަތަކަށް ވެގެންދާނެއެވެ.

މި ރިޕޯޓުގެ ހުރިހާ ބައެއް ބިނާވެފައިވަނީ ސައިޓްވިޒިޓްތަކަށް 2015 ގައި މަޝްރޫޢުގެ ކޮންސަލްޓަންޓް، ޢާދިލް މުޝްރިފާގެ ޓީމުން މި މަޝްރޫޢުގެ ސަރަޙައްދުގެ ތިމާވެށި ދިރާސާކުރުމަށް ކުރެވިފައިވާ ތަޙުޤީޤުތަކަށް ބިނާކޮށެވެ. މީގެ އިތުރުން މިފަދަ މަޝްރޫޢުތަކަށް ކުރިން ދިރާސާކޮށްފައިވާ ރިޕޯޓުތަކާއި އަދި ހޯމްޕޭޖުތަކުން ބަލާފައިވާ ތަޙުޤީޤުތަކަށް ވެސް ރިޢާޔަތް ކުރެވިފައެވެ. އަދި މަޝްރޫޢުގެ އެދިޔާރު، ރައީސް ކޮންސަލްޓަންޓުން ދީފައިވާ މަޢުލޫމާތު ވެސް ހިމަނާ މަޢުލޫމާތު ފުރިހަމަކުރެވިފައެވެ.

މިމަޝްރޫޢު ކުރިއަށްގެންދަން ހަމަޖެހިފައިވާ ސަރަޙައްދަކީ މައްޗަންގޮޅީގައި މާވަށު މަގާއި ގުޅިފައިވާ ކޮންމެ އަކަރުފާ 4400 އަކަފޫޓު ސަރަޙައްދެކެވެ. މާލޭގެ އެހެން ސަރަޙައްދުތަކާއި އެއްފަދައިން މިސަރަޙައްދުވެސް ވަރަށް ބޮޑަށް އިމާރާތް ކުރެވިފައިވާ ސަރަޙައްދެކެވެ. އަދި ޓްރެފިކް ތިމާވެށިވެސް ވަރަށް ބޮޑަށް ބަދަލު ކުރެވިފައެވެ. ނަމަވެސް އެހެން ގިނަ ސަރަޙައްދުތަކާ ޚިލާފަށް މިސަރަޙައްދުގައި މަގުމަތީގައި ހިލޭބޯރުން ބީދައިން ހުށަހަޅަފައިވެއެވެ. މީގެ އިތުރުން މާހައުލު ދުންޖަހުމުގެ ގޮތުން މާލެ ސަރަޙައްދުގެ ފުރުސަތު، މަޝްރޫޢު ކުރިއަށްދާ ސަރަޙައްދުގެ އަޑުގަދަކަމުން ހުރިހިނދުގައި، ބޯޑުވީރު ފެންއަޑު، އަދި ފެންގެ ކާރިޓު ދިރުމާއި ގުޅުނު ވެސް ބެލިފައެވެ. މީގެ އިތުރުން މިސަރަޙައްދުގައި އިޖުތިމާޢީގޮތުން އެހެނިހެން އިޖުތިމާޢީ ތަފާތުތައް ބެލިފައެވެ. އަދި މީގެ ބޭނުމުގައި އިޖުތިމާޢީ ސަރވޭ ޚާއްޞަ ހިންގާފައިވާ ސިޔާސީ އިންތިޚާބުތަކާއި ގުޅޭ ކުރިއަށް ގެންދިއުމަށް ރަނގަޅުކުރެވިފައެވެ.

މި މަޝްރޫޢުގެ ސަބަބުން ތިމާވެށްޓަށް ކޮށްފާނެ އަސަރުތަކުގެ ތެރޭގައި އެންމެ ކަންކަން ފާހަގަ ކޮށްފައިވެއެވެ. އެސަރަޙައްދުގެ ޖީއޮލޮޖިކަލް ބަދަލުތަކުން، ކޮންސްޓްރަކްޝަން މަސައްކަތާ އެކުއެކީ ފަހުން އެސަރަޙައްދުގައި އުފެދޭ ކަނޑު އިތުރުވުން، މަސައްކަތްތަކުގެ ކުރިމަގަށް ހުރަސް އެޅުން، ފެންފަސްފުރާން ބަދަލުވުމުން، ކޮއްޓު އިމާރާތްތަކަށް ގެއްލުންވުން،

މަގުމަތީ ހައްދާފައި ހުރި ގަސްތަކަށް ގެއްލުންވުން، މިކަންކަން ހިފެހެއްޓެވެ. ނަމަވެސް ކައިރީގައި 6 ބުރިއަށްވުރެ ބޮޑު އިމާރާތް ނެތުމާއި، މިމަޝްރޫޢުގެ ތެރެއިން ތަނަކަށް ފައުންޑޭޝަން ޕްރޮޖެކްޓުން މަޤާމު ބޭނުން ކުރެވުމާއި، އެންމެ ކައިރީގައި ހުރި އިމާރާތްތަކާ 1 މީޓަރުގެ އޮފްސެޓްކަމަށް އިމާރާތް ކުރަން ޖެހުމާއި، އަދި މިފަދަ އެހެނިހެން ރައްކާތެރި ފިޔަވަޅުތަކުގެ ސަބަބުން އިމާރާތަކަށް ގެއްލުމެއް ނުވާނެކަމަށް ނިންމާލެވިއްޖެއެވެ. އަދި ހަމައެހެންމެ ދުންނުވަރުއާ އެހެނިހެން ތިމާވެށްޓާއި ގުޅޭ މައްސަލައެއް ކުރިމަތިނުވާގޮތަށް މިޕްރޮޖެކްޓު ހުއްޓާލުމާއި ފިޔަވަޅުތަކެއް ނިޒާމްތަކެއް މަސައްކަތު ކުރުމުގެ ތެރޭގައި، މިމަސައްކަތުގެ ސަބަބުން ތިމާވެށްޓަށް ކުރާނެ އަސަރު ފަހަރު ބޮޑުވެން ކުޑަކުރެވޭނެއެވެ.

މިޕްރޮޖެކްޓާ ތިމާވެށްޓަށް އަސަރުކުރާ ގޮތުން ކޮށްފައިވާ ރިޕޯޓުގެ 'އެންވަޔަރަމަންޓަލް މެނޭޖްމަންޓް ޕްލޭނުގެ' އެކުލެވިގެންވާނެއެވެ. މި ޕްލޭން ތަރުތީބު ކުރެވިފައި މިވަނީ ކޮންސްޓްރަކްޝަން މަސައްކަތާ ކުރުމުގެ ޑިޒައިނާއި މަސައްކަތު ނިމުމަށްފަހު 5 އަހަރު ވަންދެންނެވެ. މޮނިޓަރިންގ މަސައްކަތުގެ ދާއިރާތައް ތިމާވެށްޓަށް ބަލާއިރު މިމަޝްރޫޢު ތަރައްޤީ ކުރަން ފެށުމުގެ ކުރިން ފަރާތް މުހިއްމު ވަސީލަތްތަކެވެ. އަދި މިޕްރޮޖެކްޓުގެ ދަށުން ހުރި ހުޅުވާލާފައިވާ ބިނާކުރުން، މިމަޝްރޫޢުގައި ޖަހަން ހަމަޖެހިފައިވާ ބޭސްމެންޓް ބައުތު ގެންނަން ޖެހިދާނެ ކަމަށްވެސް މިޕްރޮޖެކްޓުގައި އިތުރު ވަސީލަތް ފަހިކުރެވޭނެއެވެ.

މި މަޝްރޫޢުގެ ސަބަބުން ތިމާވެށްޓަށް ފޯރާ ނޭދެވޭ އަސަރުތަކުގެ ތެރޭ ގެއްލުންތަކާ ލިބޭނެ ކަމުގައިވިޔަސް މަސައްކަތުގެ ސަބަބުން ލިބޭނެ އިޤްތިޞާދީ އަދި ޖަމާޢަތީ އިޖާބީ ފައިދާތައް ބޮޑުވާނެ ގޮތެއް ހޯދާނެއެވެ. މިޕްރޮޖެކްޓާ ކަންކަން ތަރައްޤީކުރާ ބަޔަކަށް ހުރަހަކަށް ނުވާނެހެން ތިމާވެށްޓާ ގުޅޭ ގޮތުން މޮނިޓަރިންގ ޕްރޮގްރާމެއް ވެސް ކުރިއަށް ގެންދިއުމަށް މި މަސައްކަތު ތިމާވެށްޓަށް ފާހަގަކުރެވޭ އަސަރުތައް ނުކުރާނެއެވެ. އެހެންކަމުން މިޕްރޮޖެކްޓު ހުރަހަކަށްނުވާ މި މަޝްރޫޢު މިޕްރޮޖެކްޓް ފާހަގަ ކުރިއަށް ގެންދިޔުމަށް، ތިމާވެށްޓަށް ލިބޭނެ ގެއްލުން އެންމެ ކުޑަކޮށް ކުރިއަށް ގެންދެވިދާނެއެވެ.

1. Introduction

1.1 Background

This Environmental Impact Assessment (EIA) report has been prepared in order to meet the requirements of Clause 5 of the Environmental Protection and Preservation Act of the Maldives to assess the impacts of the proposed 14 storey building construction in Ma. Manaage.

The report will look at the justifications for undertaking the proposed project components and it will identify and determine the significance of the potential impacts of the proposed works. Alternatives to proposed components or activities in terms of location, design and environmental considerations would be suggested along with measures to mitigate any negative impact on the environment. Environmental monitoring programme is vital in order to demonstrate the long-term sustainability of the proposed project as well as to undertake mitigation measures before any impact leads to long-term significant effects. Long term monitoring helps to understand uncertainties in impact analysis improving future impact predictions and project implementation. Therefore, a building monitoring and management plan would be suggested.

The major findings of this report are based on qualitative and quantitative assessments undertaken during site visits on September 2015. Available long-term data were collected from available sources, such as long-term data on meteorology and climate from local and global databases. Long-term data on the project site is lacking. However, to compensate for this, data collected over the years in Male' for similar projects will be used.

1.2 Aims and Objectives of the EIA

This report addresses the environmental concerns of the building construction works and also those that will occur during the operational stage of the development. The report attempts to achieve the following objectives.

- Describe the project components to the relevant authorities and to the public
- Allow better project planning and decision-making based on the sustainable development.
- Identify environmental impacts that will occur and gauge their significance for such a project undertaken in the particular location.
- Mitigating impacts caused due to the works outlined in the project

- Promote informed and environmentally sound decision making
- To demonstrate the commitment by the proponent on the importance of environmental protection and preservation.

1.3 Methodologies

This EIA has been prepared by Amir Musthafa, a registered permanent EIA consultant with a few years of experience in Environmental Impact Assessment in the Maldives and has been actively involved in numerous coastal protection projects undertaken in the country. The consultant was assisted by the developer's staff throughout the project.

Internationally recognized and accepted methods have been used in this environmental evaluation and assessment. This EIA is based mainly on data collected during field investigation missions on September 2015. The data collection methods are described in detail under the following Section.

1.4 Methods of data collection

Conditions of the existing environment of the study area were analysed by using various surveying techniques and scientific methods. Field surveys were carried out to get a further understanding of the existing conditions at the project location, and were carried out during September 2015 to collect baseline data.

The following investigations were carried out on site.

- Groundwater quality parameters
- Existing noise pollution on site
- Traffic flow at the project site
- Socio-economic conditions in the area
- Visual exterior inspection of existing structural defects in nearby high rise structures

1.4.1 Groundwater quality

Groundwater quality was measured at the project location. Groundwater was collected by dipping into groundwater wells using 1500ml plastic bottles and sterilised water collection bags. The containers were filled and taken for testing at the MWSC laboratory within 3 hours for testing.

1.4.2 Noise Pollution

Noise pollution at the project area was measured using a handheld noise measurement device using Decibel 10th 3.8.1 software. Noise measurements were undertaken at the locations shown under Existing Environment section.

1.4.3 Traffic flow

Traffic flow was measured by visual observation of traffic within a predetermined area at the project location within a specified period of time using a stop-watch. The no. of heavy duty vehicles, cars, motor-cycles, bicycles, and pedestrians at the area in a 30 minute period were noted down by visual inspection. Previous studies undertaken were also referred to.

1.4.4 Stakeholder consultations

Stakeholder consultations were mainly carried out in the EIA scoping meeting held on 14th September 2015. The EIA scoping meeting gave the opportunity to consult with the Environmental Protection Agency, project developer and contractor, and the Ministry of Housing and Infrastructure in one sitting. Additionally consultation with the Male' City Council, Ministry of Housing and Infrastructure, and Project engineer, were carried out throughout this study, both via mail and in person.

1.4.5 Built Environment

An overview of the built environment around the project site was undertaken by visual inspection with the aid of photographs. It is recommended in the report to undertake a thorough defects inspection of neighbouring structures by a civil engineer.

Once the EIA has been submitted it is expected that the review process will not take more than 2 weeks. The review process may result in the request for additional information before issuing a decision statement. However, all efforts have been made to ensure that adequate information has been provided with specific attention paid to meet all requirements of the Terms of Reference (TOR). The TOR for this EIA is given in Annex 1.

1.5 References to similar studies

As there have been several muti-storey building projects undertaken in Male' City recently by various consultants, several of them were studied. These include the following:

- EIA for 14 Storey building construction in G. Hudhukoka, 2015
- EIA for H. Point Villa multi-storey building, 2015

- EIA for Hulhumale' mixed use residence, 2015
- EIA for 11 Storey building construction in M. Thulhaadhooge, 2015

1.6 The Proponent

The project is being proposed by Rainbow Construction Pvt. Ltd. Rainbow construction is both the developer and the contractor for this project. Rainbow Enterprises Pvt Ltd (Rainbow) is the holding company and was registered in Republic of Maldives in 1990 had its origin in the building industry. The founding shareholders of Rainbow were the group who started the first registered architectural and engineering firm (Tekton Design Associates Pvt Ltd) in the Maldives.

Rainbow Construction will handle project management, consultancy, and the physical construction of the project. They provide total solutions encompassing all the components of major construction works.

1.7 The Project Location

The project is based at Ma. Manaage residence in the Machangoalhi district in Male', the capital city of Maldives. Location coordinates are at 4°10'26.77"N 73°30'24.24"E. The road in which the site is located is Maaveyo Magu. With a decent amount of vegetation and moderate traffic compared to other main roads in Male' City, Maaveyo Magu is regarded as a relatively tranquil road.

There are few buildings located in the area including the land adjacent to the site, which has recently been erected as a 5 storey building.

The precise location is shown in the following satellite image (Figure 1) taken from Google Earth and Map image from www.raajjemap.com. A more detailed site plan is given in Annex XX.

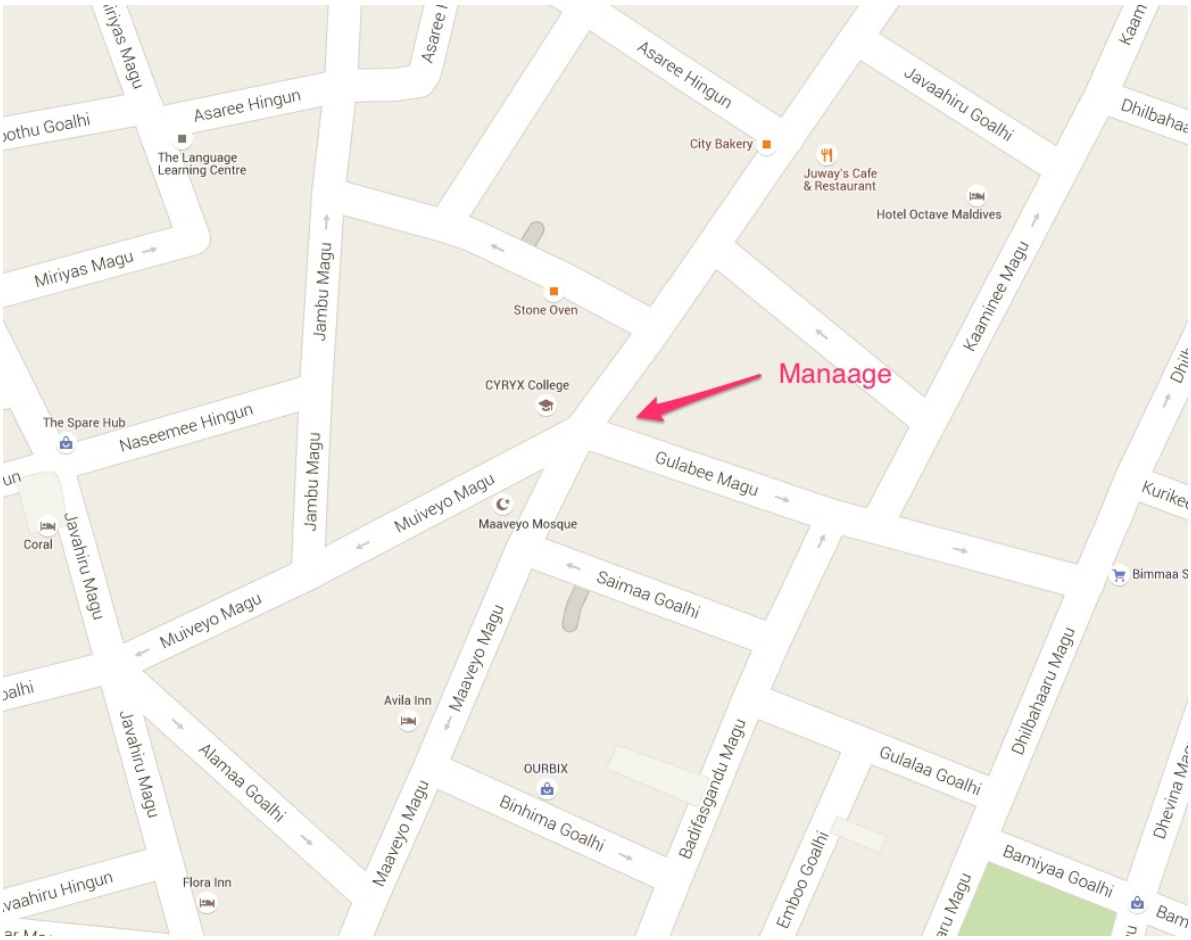


Figure 1 Location of MA. Manaage in Male' (source: Google Earth and http://www.raajjemap.com)

1.8 Need and Justification

The capital city Male', where the project is located is among the most densely populated island cities in the world. With a land area of 5.8km^2 accommodating a population of 103,693 (Census, 2006), land scarcity is felt throughout the already vastly dense concrete island. With such a population concentration, and the need to continue living in the island, the solution had been to develop high-rise building to accommodate increasing no. of people. With no land for horizontal development, the result had been to develop vertically.

This current project is also part of this continuing trend of vertical development to mitigate the issue of land scarcity. Upon development, the building would provide 3 apartments in each floor, which would in turn provide housing accommodation to more than 39 families. The site will also provide much needed commercial space in the ground floor for shops.

Since this project is a commercial project, constructing the building in the landlords privately owned land, the project will be entirely commercial. It is not a government based social housing project, and the units will be rented as real estate developments. Nevertheless, more housing units in Male' would lead to more residential opportunities to the citizens living in the island and would assist in alleviating the housing issues currently faced at the capital. The proposed project is expected to increase the housing units and commercial floor area available in Malé.

2. Project Description

Ma. Manaage is a 413.39 square metre plot located on the corner of Maaveyo Magu and Gulabee Magu in the capital Male'. Currently the site has been demolished and there are no structures or vegetation on the plot itself; there is only bare land. Regarding public facilities, Maaveyo Miskiy is located just 40m away from the site, while Cyrix College is also nearby. There are commercial units around the site, as is the case anywhere in Male'.

Figure 2 Project Site Demarcated

Figure 3 Maaveyo Miskiy near project site

Project site plan is given in Figure 4, while relevant excerpts from the site plan, including building elevation, typical floor plans is given in Figure 6 – Figure 8.

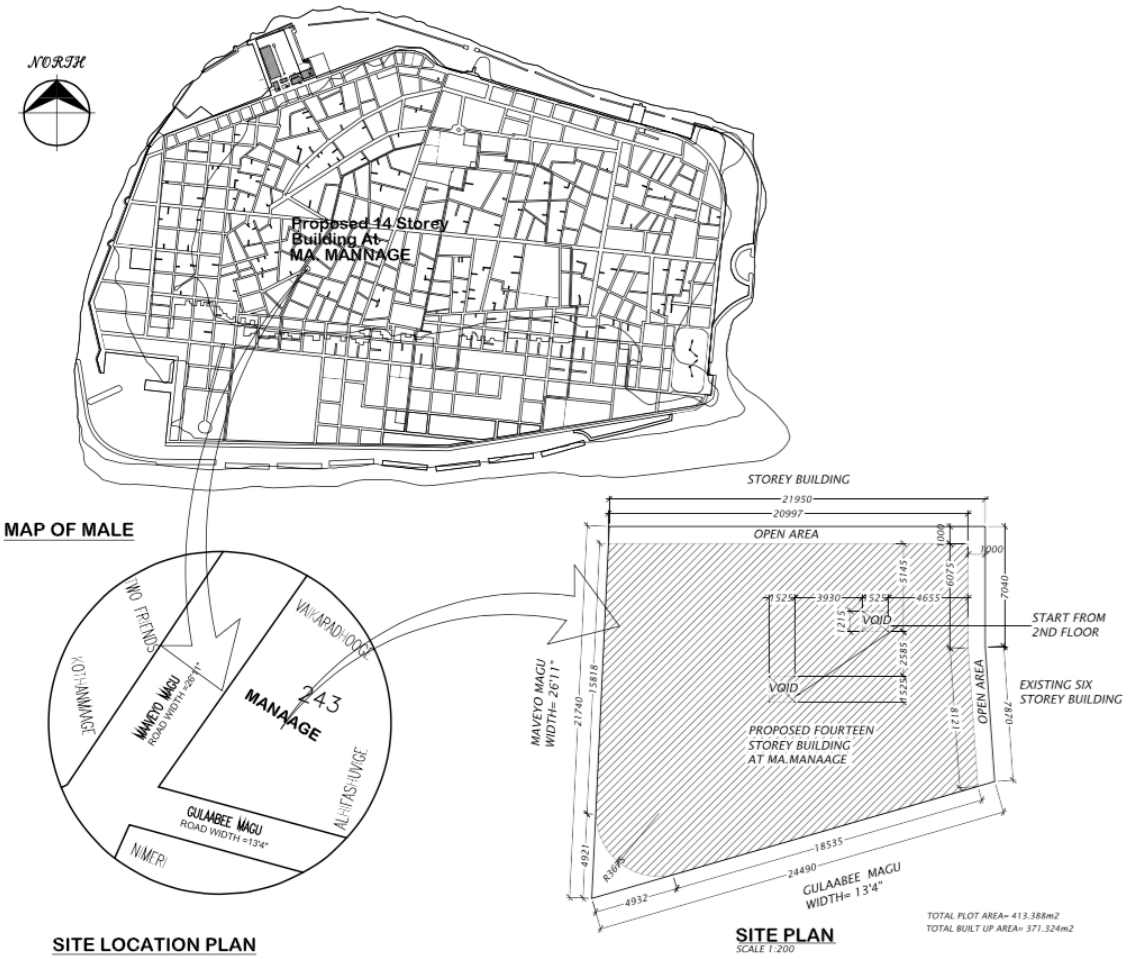


Figure 4 Project Site Plan and Study Area

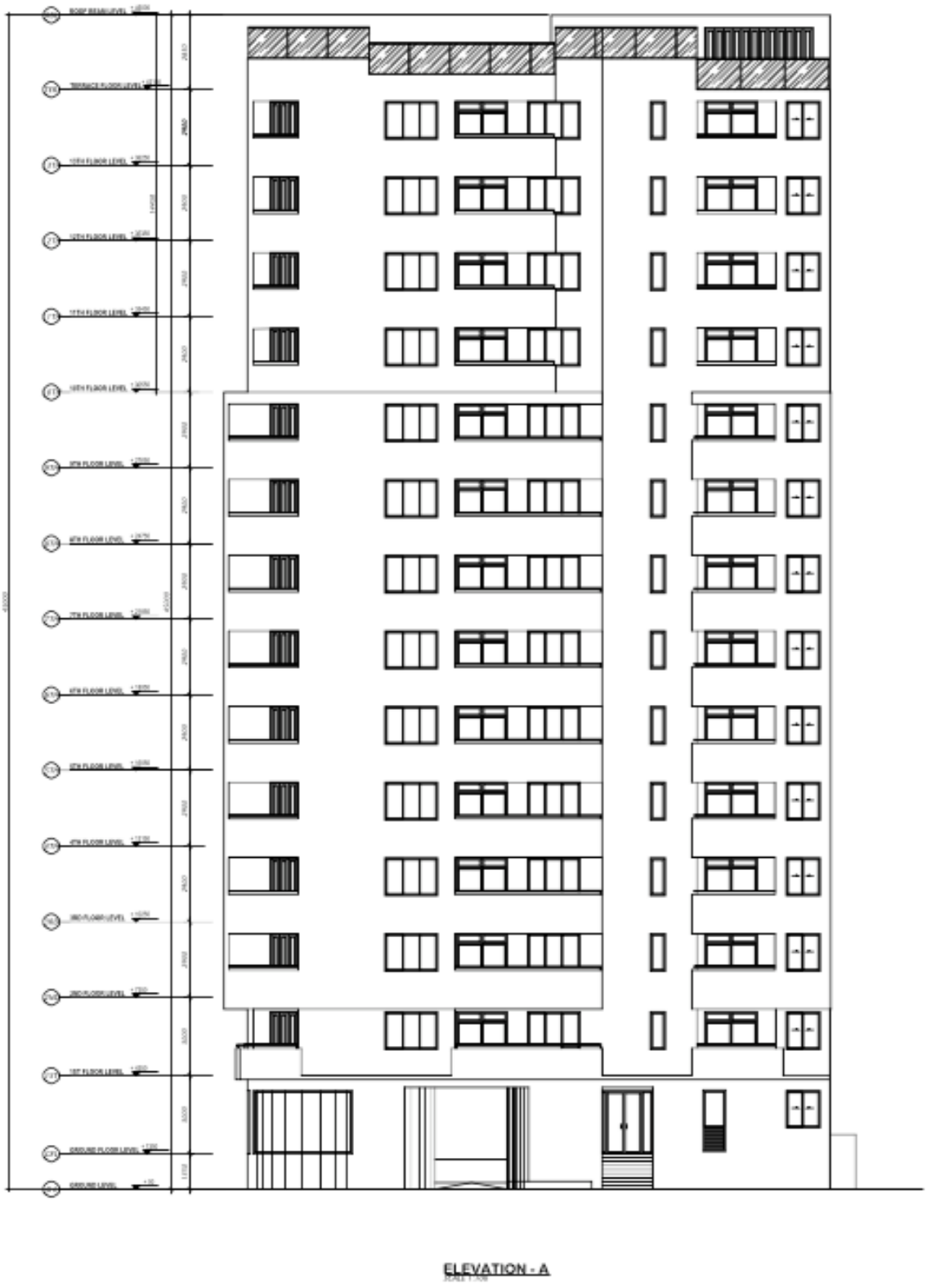


Figure 5 Building Elevation

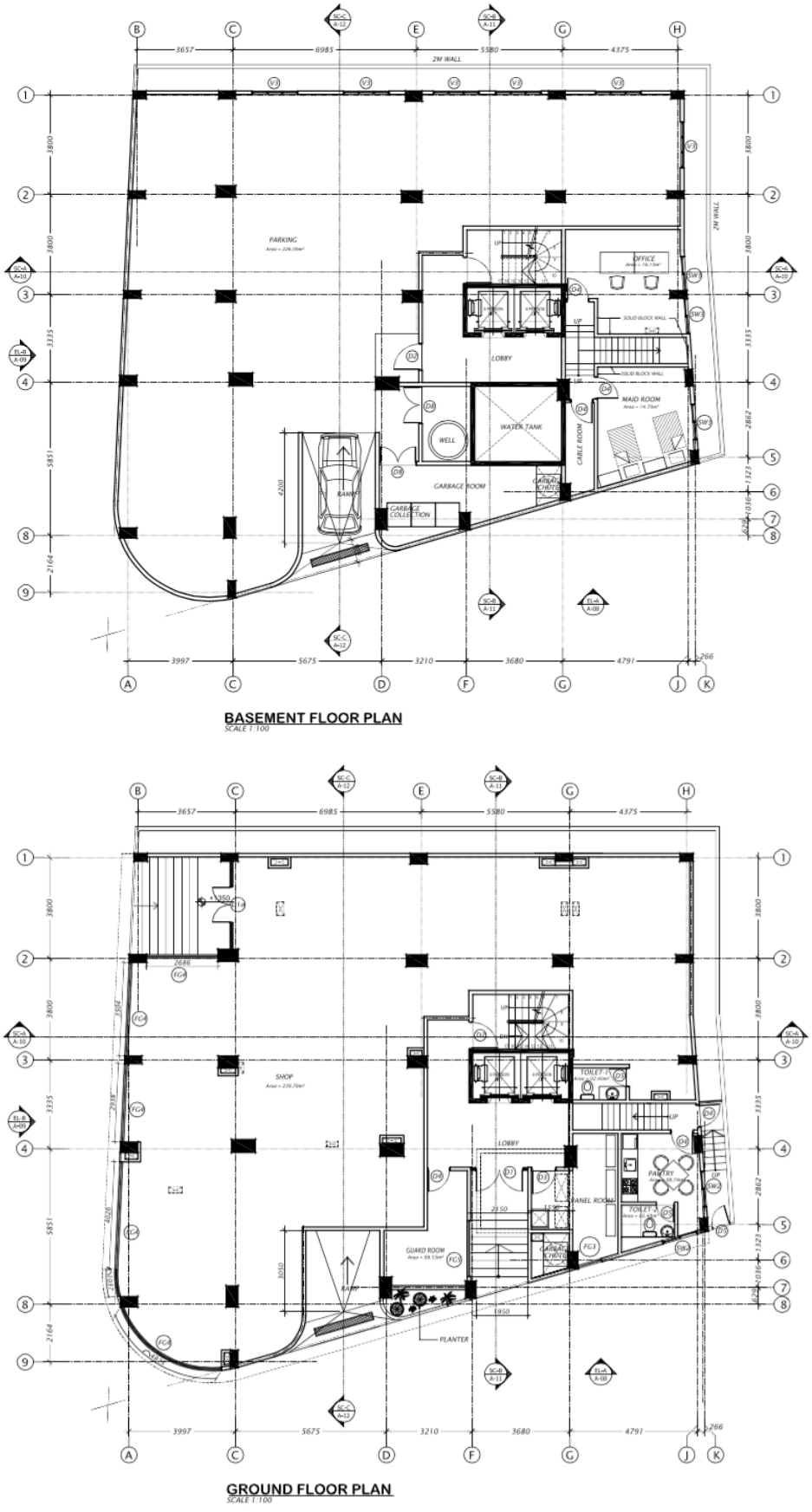
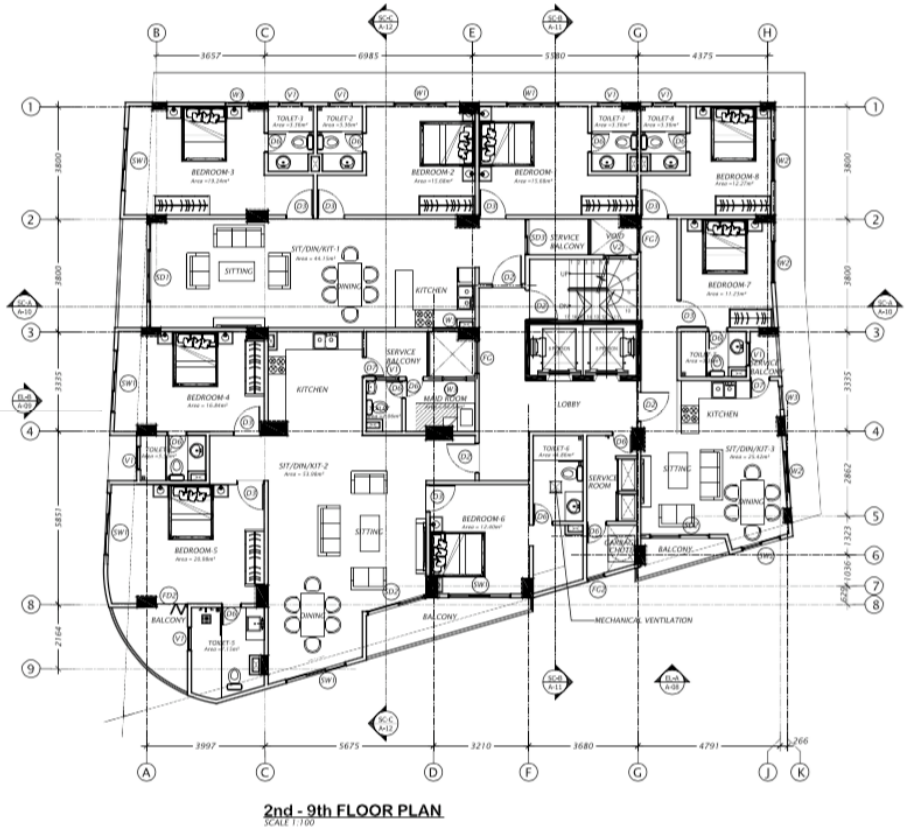


Figure 6 Basement Floor Plan and Ground Floor Plan



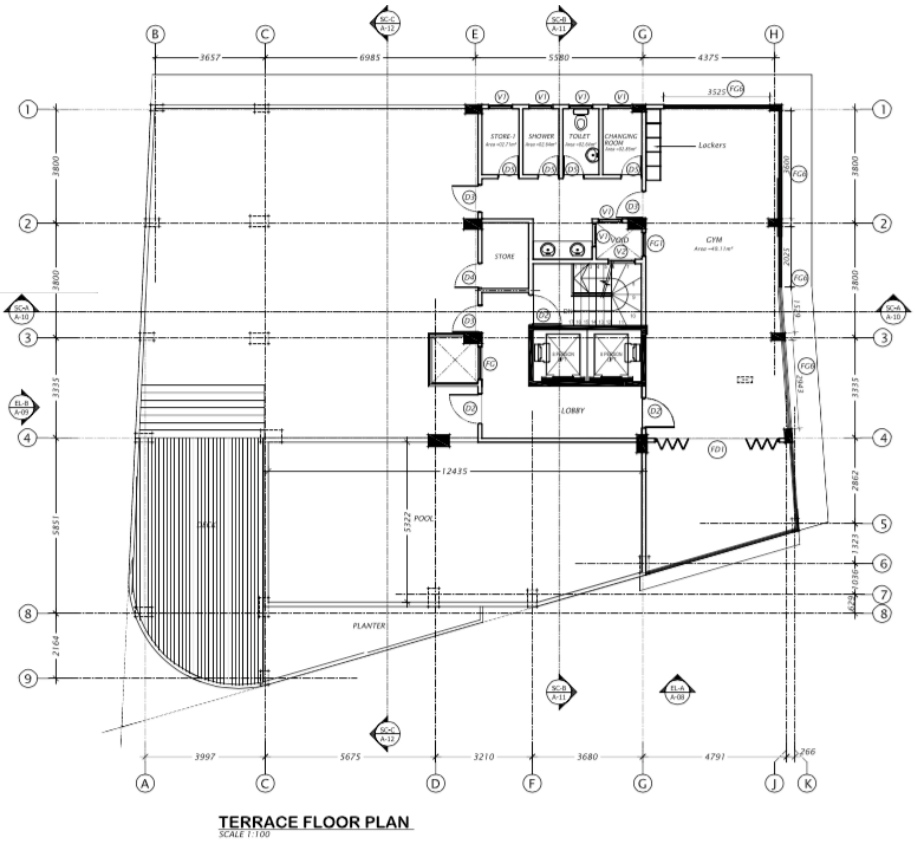


Figure 7 Typical Floor Plan and Terrance Floor Plan

2.1 Design Details

Important design details for the project are given below:

- Plot Area: 413.39 m^2
- Development footprint: 371.324 m^2
- Elevation: 45 m
- Foundation depth: 2.1 m
- Foundation type: raft foundation
- Foundation thickness: 800mm
- Terrace use: recreational area with pool and gym
- Half basement use: service facilities including garbage collection and Parking
- Ground floor use: commercial shops
- Remaining floor use: residential apartments

2.2 Demolition of existing structure

Demolition of existing structure has already been undertaken with the approval from Male City Council. Demolition was contracted to RKL group, which is one of the most leading groups for such works in Male'.

The area has been demarked and all debris contained within the site. Most of the building and construction waste have now been removed. The works were carried out with proper safety precautions, and workers use safety equipment and clothing at all times. Demolition works were carried out using Excavator and Demolition hammer. During demolition, care was taken not to cause any damage to nearby structures.

2.3 Excavation works

It has been established that the depth of foundation will be 2.1m below the existing ground level. Therefore maximum depth of excavation will be up to 2.2m. The estimated depth of water table in the area is 1.4m from ground level. As the ground water table is 1.3m above the proposed foundation depth at nearly all tide levels, dewatering will have to be continuous throughout the period of casting the foundation. Excavation will be undertaken with a backhoe excavator. When all the necessary excavation is complete, a 50 mm thick lean concrete (Grade C15) layer will be laid to provide a level surface to assemble the reinforcement of foundation raft slab and beams.

2.4 Foundation Protection

There will an offset of 1m from the nearest adjacent building in the same block. MS sheets, 9mm thick, are proposed to be hammered into the ground between the proposed and the existing adjacent building wall and 50 x 50 mm MS angle shall be fixed vertically and horizontally at 600 mm intervals. Scaffolding GI pipes, 48mm diameter shall be used at 600 mm spacing to prop the MS sheet wall and the wall shall be braced from all directions. A stepped excavation at 600mm centres shall be done to prevent destabilising of the soil from underneath the adjacent existing foundation.

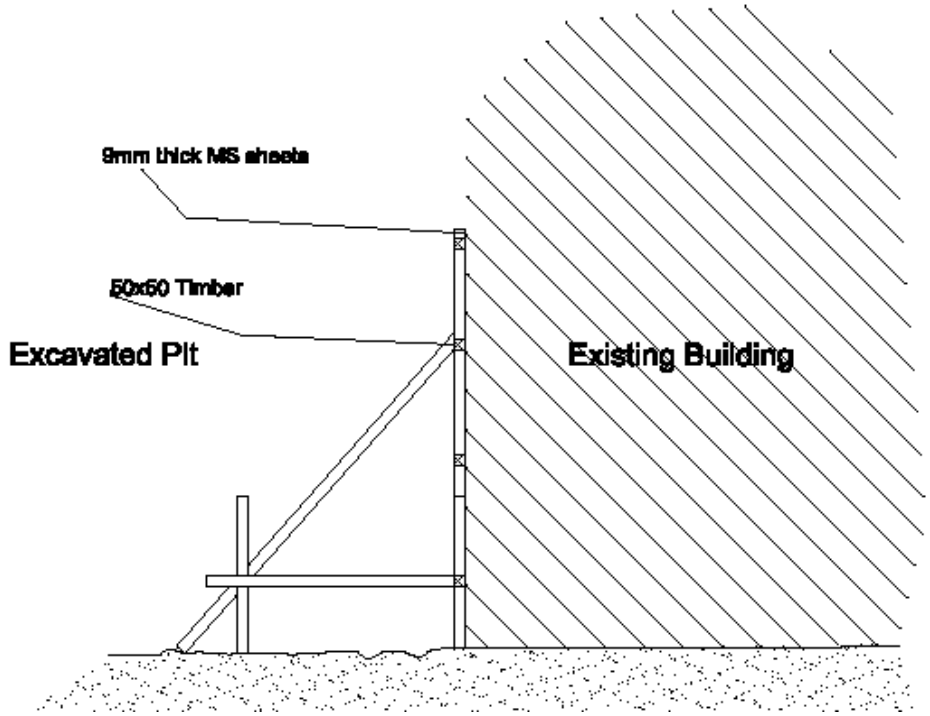


Figure 8 Schematic showing typical Foundation Protection method in place.

2.5 Dewatering

Dewatering is the localized lowering of the ground water table from its natural level, in order to create a dry environment for construction works. This is a critical process for creating the correct working conditions to establish the building substructures.

As previously stated, dewatering will be a continuous process and will be on-going simultaneously while excavation is being undertaken. The process will be continued throughout until casting of the foundation. It is envisaged that 5 or 6 pumps each with the flow rate of 30 litres per second will be located at specific locations to pump out the water to the temporary junction provided by MWSC. The dewatering works will be done entirely by MWSC.

It is anticipated that the project site will require approximately 30 kW of power during the construction phase, while 25 m^3 per day of desalinated water in anticipated during the construction stage of the development

2.6 Building Foundation

For the foundation works, a raft foundation be used. This is currently the most commonly adopted method of construction in Maldives. It enables to spread the load from a structure over a large area, minimizing the pressure exerted on the base. Beams will then be incorporated into the structure to stiffen the foundation.

Excavation in loose sand requires continuous support, and therefore supports will be placed immediately as excavation commences. Sheets would be closely spaced and horizontal support bracings provided as excavation progresses. Supports and bracings will be placed concurrently with excavation, moving along the periphery of the plot successively. The concrete works for the raft foundation will be done using C30 Grade concrete. An anti-separation additive would be used to promote bonding of the concrete mix, since the concrete works will be done underwater.

2.7 Structure of the building

Once the main substructure casting is over, the site will be backfilled up to the basement floor slab bottom level.

One 1300 mm diameter well will be constructed underground along with a 3.3m x 2.8m water tank. Water tank is required to store water for fire extinguishing purposes.

A half basement will be constructed 1.1m below ground level reaching an elevation of 2.45m.

The structure will be entirely a reinforced concrete structure.

2.8 Construction materials and machinery

The construction materials to be used are detailed in Table 1. All the materials such as cement, Aggregate and Sand will be delivered to site based on consumption. Steel and Plywood will be stored at the contractor's warehouse. Barb bending and carpentry work will be prefabricated at company work yard and transported to site.

2.9 Utilities

Water and sewerage facilities will be provided by the MWSC water and sewerage network. Therefore water will be desalinated water from the main supply. And sewage will be disposed untreated along the main water outfall

Electricity will be provided by STELCO. Backup generator will be placed on site by the house owners. A Perkins Sound Proof Diesel Generator, with specifications of 100 KW, 125/140 kva will be in place.

The backup generator will be used after construction, when STELCO electricity failures for operation of Lift and lighting at common areas.

It is anticipated that the project site will require approximately 30 kW of power during the construction phase, while 25 m3 per day of desalinated water in anticipated during the construction stage of the development

During the construction, the amount of wastewater generated would be relatively low compared to its generation during the operation phase of the development.

2.10 Project Management

The project is managed by the contractor, Rainbow Construction Pvt. Ltd. Construction works is undertaken entirely in house using company staff, most of which are made up of expatriates. The following figure 3 shows the Project Management organisation chart for the project.

All labourers will be accommodated at Company Labour Quarters. All operations, work planning for the on-going construction work will be done at Site Office; Major operations will be done at company head office. Heavy machinery such as Excavator, Dump Truck, and Crane will be used during excavation and casting. Some of the machineries are rented while most equipment and machinery are owned by the company.

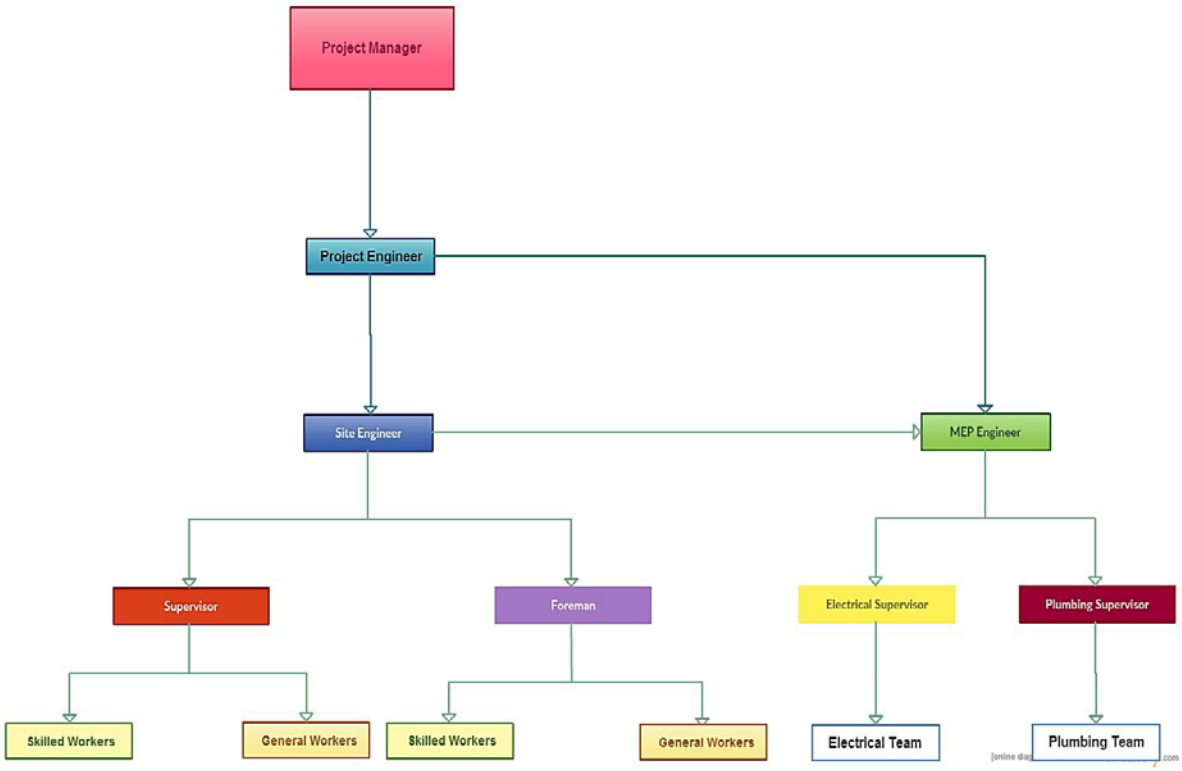


Figure 9 Project organisation chart

2.11 Waste Management

Construction debris generated during the demolition work will be cleared from the site and disposed at the Building and Construction waste land fill in Male'. Sand excavated during foundation work will also be transported to this landfill site. Upon completion of foundation works, sand will be purchased from same land-fill for back filling.

It is estimated that during the construction phase, the project will generate wastes around 2 – 4 tons per day which will be collected on site, transported to the waste collection centre at Male' and finally disposed at Thilafushi. None of the waste will be placed outside the project boundary at any time. Temporary waste storage will be within the project-demarcated area.

All waste generated during concrete works phase and finishing phase will be collected at the end of each work day and temporarily stored in the ground floor. Construction solid waste will be transported to land fill site once a week. Hazardous waste such as empty oil-cans (lube-oil), paint cans or strainers will be kept separate and disposed according to the standards established by relevant government authority.

For waste generated during operations, waste collection bins will be kept at ground floor garage area. Garbage chutes will be placed in each floor. On a daily basis waste will be dumped at Male waste yard.

2.12 Road closure and traffic re-routing

The proposed building is located near the Maveyo magu. Access for the building is from the main road Maveyo magu and from the internal road Gulabee maagu.

Prior to casting of foundation or slabs; permit will be taken from Male' City Council or *Aanmu Hidhumaiythakaa Behey Bai* (AHBB) under Ministry of Housing and Infrastructure for road blocks in Maaveyo Magu between Saimaa Goalhi & Alimas Magu. The precise location is shown in Figure 5.

However, since there is relatively bigger space available in the Maaveyo Magu – Muiveyo Magu Junction, all efforts will be made to utilise this space and keep road closures at a minimum.

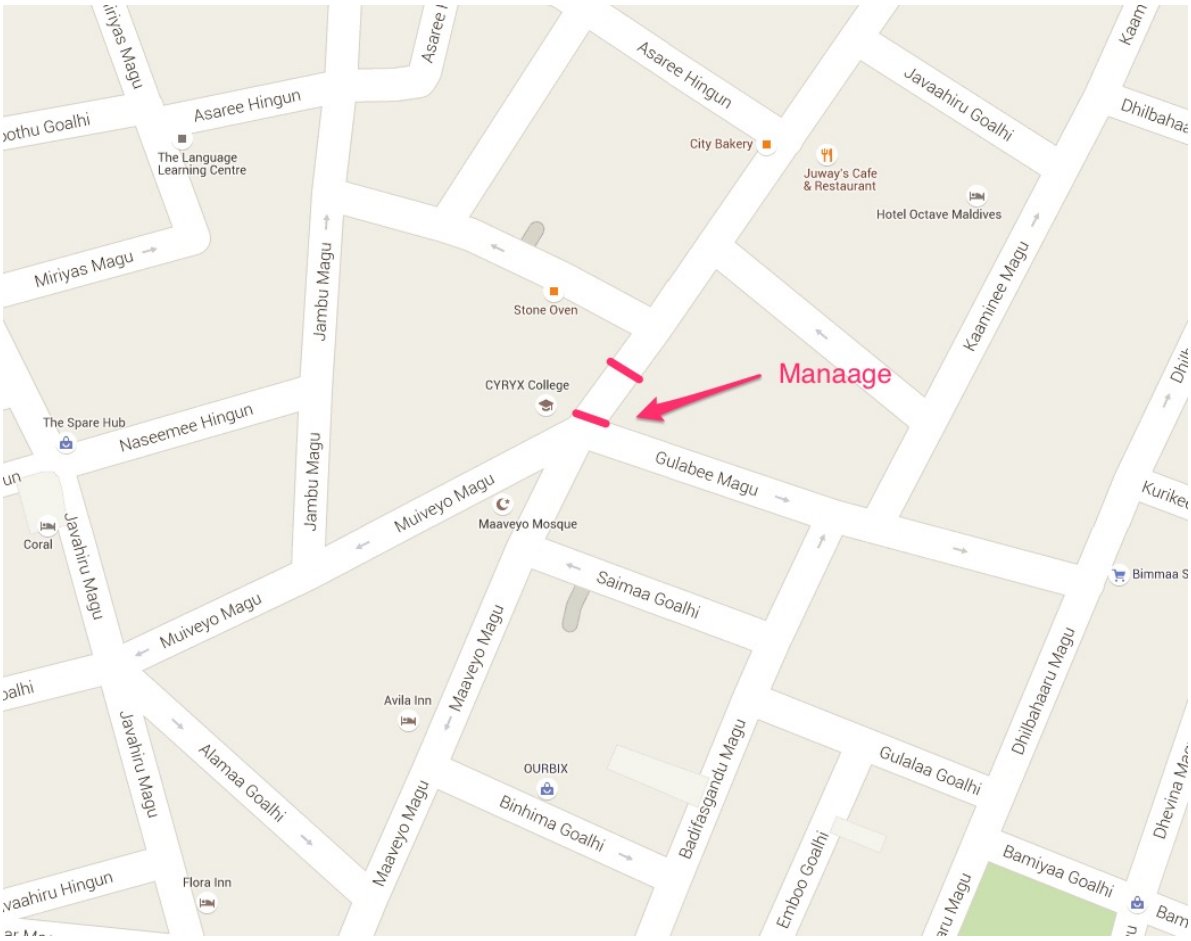


Figure 10 Proposed road closure location

Road closing will be based on guidelines set by AHBB. In all cases the time will be minimized and for major construction works the Road will be closed at low traffic hours.

Road closures need to be undertaken for 2 major project components: foundation work and casting slabs. Maximum no of hours for foundation work will be 14- 15 hours. For each slab casting it will be 8- 10 hours.

2.13 Work Schedule

The project is expected to commence soon after the approval of this EIA report, which should take approximately 2-3 weeks from submission.

Initially the architectural and structural design works had been completed and approved before undertaking the EIA. Once the EIA is completed, demolition of the existing structure will take place. Dewatering is scheduled to commence next, which will be carried out by MWSC. Upon completion of dewatering, foundation works will begin and soon thereafter structural works will be carried out. Masonry work and interior works will commence afterwards.

The detailed project work scheduled is attached in Annex 5.

2.14 Safety on site

All precautions will be taken for safety of workers during the construction stage. Barricades, warning signs or devices will be placed on the road during casting or road works (connection of water lines and sewer lines) for safety of pedestrians and vehicles.

All workers are given instructions about the health and safety at Site. The Site Engineers and Supervisors will give a brief on daily basis before the work starts to all workers and all proper health and safety precautions will be implemented on site. Safety signs will be used on site, some of which are shown in the following Figure 6.

Personal protective equipment will be available for all the workers, for falling objects, hazardous dust or chemicals, or high working areas. Emergency first aid kit will be at site for minor injuries. First aid kit will be provided in the temporary office on the ground floor, after completion of ground and first floor slab where all safety clothing and equipment will be held. All workers and personnel entering the premises will be given hard hats and safety shoes.

Figure 11 Some safety signboards to be used on site

2.15 Accident and hazard scenarios

Assessment for accident and Hazard is given below.

The following hazard and accident assessment is based on the following 3 stages of the building lifecycle, including construction, use and maintenance of building. Risk levels & probability are qualitatively assessed based on the following parameters; High, Moderate and Low.

Table 1 Accident and Hazard Risks

Performance Consideration	Risk Level	Risk Probability	Responsible Personnel
Presence of hazardous substances, which impact on construction work eg: asbestos, SMF, hydrogen chloride, etc.	High	Low	Project manager, Site Supervisor
Sufficient access / space around new section or building for use of cranes,	Moderate	Moderate	Project Engineer

scaffolding during construction			
Construction workers will be protected from / proximity to HV electrical, high risk energy sources	High	Moderate	Site Supervisor
Traffic / pedestrian risks are minimised for planned loading & unloading for construction vehicles	High	Moderate	Site Supervisor, Project Manager
Neighborhood construction considerations eg:, school vicinity, site location	Moderate	Low	Project Manager, City Council
Roof design will reduce /eliminate the risk of falls from height during construction	Moderate	Moderate	Project Engineer
Sufficient space is planned for access & to install / major fixed plant or equipment or specialised equipment, plant rooms	Low	Moderate	Project Engineer
Floor loading design has been assessed by engineer to be able to accommodate heavy equipment / plant to be installed in future	Moderate	Moderate	Project Engineer
Floor surfaces – even level with no sudden changes in levels – floor coverings non slip, suitable for levels of traffic use and suitable for type of tasks to be done	Moderate	High	Project Engineer
Stairs and balcony – edge delineation, slip resistant (SR) stair nosing, construction / design suitable for intended use, handrails, non-horizontal railings in balcony	Moderate	High	Project Engineer

Window positioning and solar glare	Low	High	Project Engineer
Safe Access to lighting fixtures to change fitting, bulbs	Low	Moderate	Project Engineer
Safe Access to plant rooms – locked, lighting.	Low	High	Project Engineer
Access to roof tops – safe access to within safety zone, minimised manual handling of material, equipment tools.	Low	Moderate	Project Engineer
Accessible window cleaning methods	Low	High	Project Engineer
Accessible gutter cleaning methods	Low	High	Project Engineer
Accessible dirt or rubbish collection points	Moderate	Moderate	Project Engineer Maintenance Officer

2.16 Project Inputs and Outputs

Each component of the project has inputs and outputs based on human resources, economics, and the environment. However, since the operation is carried out in house, project inputs and outputs are greatly conserved and limited.

The major inputs and outputs associated with the project as a whole, encompassing all the components, are tabulated below. Table 1 highlights the main inputs, while Table 2 highlights the major outputs.

Table 2 Main inputs from the proposed project

Input resource(s)	Estimated Quantity	Main sources of resource
Construction workers	01 Project Manager 01 Project Engineer 01 Consultant	Contractor's permanent staff. Project staff. Labourers mostly registered workers from Bangladesh.

	Engineer 02 Local Supervisors 20 Skilled Foreign Laborers 10 Non Skilled Laborers 03 Security Staff (24 Hours security)	
Machinery and equipment	Excavator Concrete Mixer Dump Truck Crane	Contractor's own equipment.
Energy supply (during construction)	30kW	From STELCO mains
Backup energy supply (during operations)	100 kW	Procured from abroad
Cement (Ordinary Portland cement)	14,000 bags	Procured from local supplier
Sand	35,000 bags	Imported from abroad
Aggregates	53,000 bags	Imported from abroad
Ply wood (12mm thick),	3,250 No.	Procured from local supplier
Timber (Hard wood)	21,000 No.	Procured from local supplier

Steel	240 tons	Imported from abroad
Painting Exterior (Seamaster, or Equivalent Emulsion) Interior (Seamaster or Equivalent Emulsion)	Not yet determined	Procured from local supplier
Masonry Blocks (300x150x150)	170,000 No.	Imported from abroad
Hydraulics and Drainages	All the UPVC pipes and fittings shall be used high pressure pipes.	Procured from local supplier
Tiling materials	General Floor - 600x600mm Homogeneous tile. Toilet floor - 200x200mm Non slip Ceramic tile. Toilet wall - 200x300mm Ceramic tile.	Imported from abroad

Table 3 Major outputs from the proposed project

Products and waste materials	**Anticipated quantities**	**Method of disposal**
Waste generated during construction	2-4 tons per day	Collected and sorted ground floor, and taken to Male' Waste collection area.
Waste water (dewatering)	30 litres/second	Water flow to junction provided by MWSC and to the lagoon via storm water drainage pipes
Waste oil and grease	Minute quantities	Collected in used containers and transported to waste site
Air pollution	Debris in minute quantities	External influence minimised by site demarcation temporary boundary walls.
Noise pollution	>80 db(A)	Minimised by site demarcation barriers. Ear muffs and safety equipment for workers on site.
Waste generated during operations	1 – 2 tons per day	Collected on site and transported to waste collection site in Male'
Waste water generated during operations	165 tons per day	Via MWSC sewerage network

3 Description of the Existing Environment

This section covers the existing environmental conditions of the project site. Since this is a housing project, the key components with respect to the project under consideration are described below.

- Climate
- Existing structures
- Vegetation
- Traffic flow
- Noise pollution
- Water quality
- Hazard vulnerability

Data was collected using methods discussed in Section 1.4.

3.1 Climate

This section deals with the regional and local climate of the study area. Since the Maldives does not experience relatively highly varying climate patterns throughout the country, utilising the climate conditions on a regional scale provides good indicator for the local environment, albeit with some errors.

Therefore data has been taken from the weather station at Hulhule', the island which accommodates the International Airport. Long-term meteorological data for Hulhulé is available and being only 1 km away from the capital city, the station is at an ideal location.

The Maldives, has a warm and humid tropical climate with average temperatures ranging between 25°C to 30°C and relative humidity ranging from 73 per cent to 85 per cent. The country receives an annual average rainfall of 1,924.7mm in the central parts of Maldives, where Male' is located. (Department of Meteorology, 2012).

The climate of the Maldives is dependent upon the Indian Ocean Monsoons. Monsoon wind reversal plays a significant role in weather patterns.

The two monsoon seasons observed in the Maldives include the Northeast (Iruvai) and the Southwest (Hulhangu) monsoon. The northeast monsoon is the dry season that occurs from

December to February and the southwest monsoon is the rainy season, which lasts from May to September. The transition period of northeast monsoon occurs from October to November while that of southwest monsoon occurs between March and April. The 'four seasons' of the Maldives is highlighted in the following Table 4.

Table 4 Four Seasons of the Maldives

Seasons	Duration
South West Transition	March to April
South West	May to September
North East Transition	October to November
South West Transition	December to February

3.1.1 Wind

Wind is an important indirect process affecting formation, development and seasonal dynamics in the Maldives. Winds often help to regenerate waves that have been weakened by travelling across the reef and they also cause locally generated waves in lagoons. Therefore winds are an important factor, as being the dominant influence on the hydrodynamics in most coastal areas. However, for the purpose of this project, the impact of wind on the surrounding water is negligible. The more important factor is the impact it will have on the full height of the 15 storey building.

The two monsoon seasons have a dominant influence on winds experienced across Maldives. Since Maldivian islands are spread across the equator, monsoons are relatively moderate while strong winds and gales are rare. However, during South West monsoon gusts of up to 60 knots have been recorded at Male'. Wind is an important indirect process affecting the formation, development and seasonal dynamics of the Maldivian islands. Reversal of winds in the Maldives means change of seasons from North East monsoon to South West or vice versa.

General wind surface wind pattern over the country during North East monsoon is north-easterly direction whereas during South West monsoon mean wind flow is westerly.

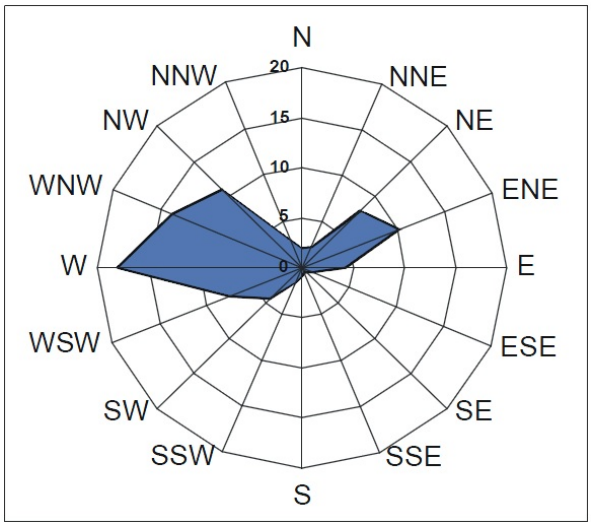


Figure 12 General wind rose diagram (MEEW, 2006)

3.1.2 Waves

Wave climate is not as important for a structure in the middle of the island. Therefore, for the purpose of the EIA, there were no measurements carried out for the wave generation on a local scale. However, regional data has been studied and visual observation on site was used to analyse the environment, as even though direct wave impact will not occur at the project site, inundation due to larger swells is possible for the entire island.

Two major types of waves are formed on the Maldives coasts: wave generated by local monsoon wind and swells generated by distance storms. The local monsoon predominantly generates wind waves, which are typically strongest during May-July in the aforementioned southwest monsoon period. During this period, swells generated north of the equator with heights of 2-3 m with periods of 18-20 seconds have been reported in the region. Local wave periods are generally in the range 2-4 seconds and are easily distinguished from the swell waves.

Swell waves are the main cause of concern. There is virtually no reef flat currently available which provides a natural breakwater and protection from large waves. However, the coast around Male' is heavily built and protected using tetrapod blocks and concrete sea walls.

3.1.3 Rainfall

The average annual rainfall for the archipelago is 1,937mm. There are regional variations in average annual rainfall. Southern atolls receive more rain compared to the northern atolls (MEC, 2004). Mean monthly rainfall also varies substantially throughout the year with the dry season getting considerably less rainfall. The north east monsoon is known as the dry season and the south west monsoon the rainy season.

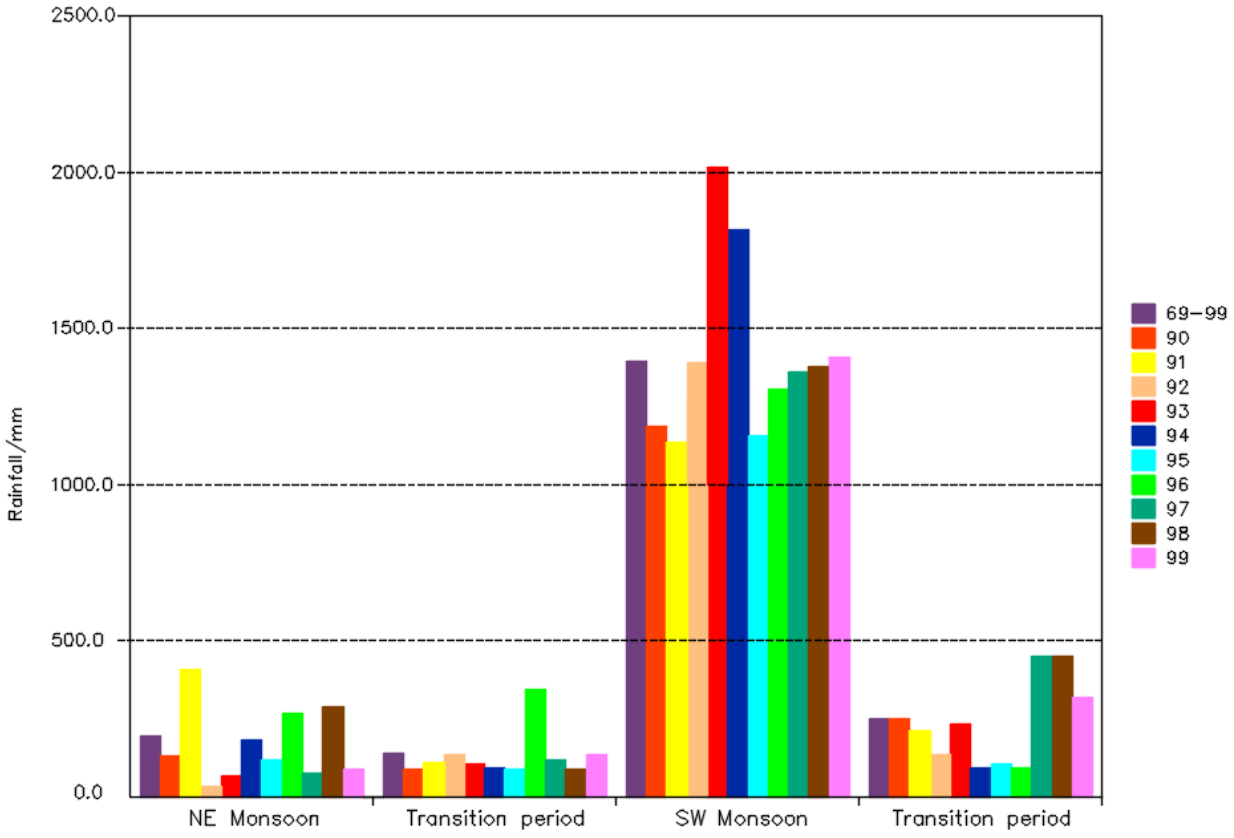


Figure 13 Annual Seasonal rainfall variation in Male'

3.2 Existing structures

There are very few other buildings on the same block as Ma. Manaage, none of which are high rise buildings. There are 6 structures higher than 2 storeys: Zemaa, Alhifashuvige, Montreal, Dhoogas, Silver Daaz, Fulooniyaage. The main public property is to the south of the project site on the adjacent block is the Masjid Bahaudheen, also known as Maaveyo Miskiy. This is a 2 storey building structure about 20 m away from the site.

There are no schools nearby. However, Cyrix college is within about 30m.

Figure 14 Significant structures in project site block

Figure 15 Ma. Zemaa (left) and Ma. Alhifashuvige (right)

Figure 16 Ma. Montreal (left) and Ma. Fulooniyaage (right)

Figure 17 Ma. Dhoogas (left) and Ma. Silver Daaz (right)

From an exterior visual inspection, there does not appear to be any significant structural defects at the noted sites as can be seen from the figures. However, a building condition assessment was not carried out as part of this EIA as it is not strictly an environmental investigation and not given in the TOR. It is nevertheless recommended that the proponent carries out such an investigation at the noted sites with the consultation of a civil engineer.

3.3 Vegetation

The site has been used as a residential area and therefore there is no vegetation to be found at the site. Moreover, the site has been already cleared. There are 2 coconut palms east of the project site, and huge ofi-eley gas *(Pterocarpus indicus)* on the west. Photographs of these are shown in the following figure. The project will have no impact on the palms, while any impact on the larger roadside trees can be avoided by mobilising machinery and vehicles from the other side of Maaveyo Magu as discussed under Project Impacts and Mitigation.

Figure 18 Vegetation near project site

3.4 Traffic Survey

Traffic load at Maaveyo Magu was expected to be moderate relative to the busier roads of Male'. The survey was undertaken on the Maaveyo Magu – Muiveyo Magu junction. As the road does not accommodate many shops, schools, or public facilities, traffic generally flows rather smoothly. However, still there was significant traffic in the area as can be seen from the survey results.

Traffic increases on a regular basis based on the traffic congestion in Majeedhee Magu. Every 3 minutes, there is a spike in motorcycle, cars, and heavy vehicles passing the project area.

In this regard traffic counts were carried out on 5th October 2015 from, 12:00 -13:00. Summary of data recorded is provided in the following figure.

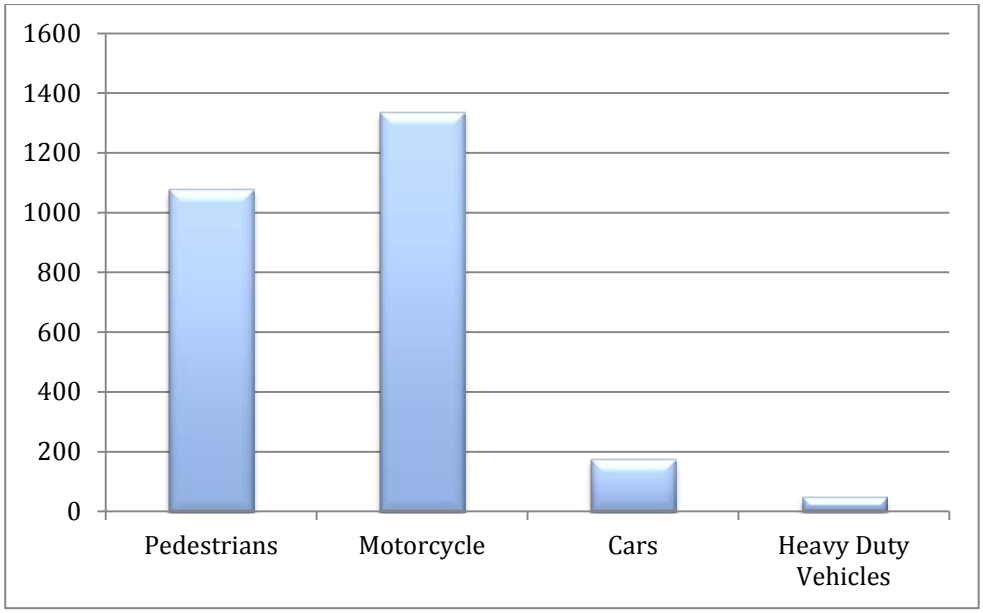


Figure 19 Traffic flow from 12:00 - 13:00 at Maaveyo Magu – Muiveyo Magu junction.

As the results demonstrate, the traffic in the area can be regarded to be moderate to high. Any potential road closures have to take this into account before commencing works on site.

3.5 Noise Pollution

Noise pollution can be an environmental and health hazard. However, there are no currently no guidelines for noise levels at residential areas in general. Examples of guidelines with regard to noise for residential areas as set World Bank Environmental Health and Safety guidelines for noise at residential areas are: Daytime reference value for noise as set by the bank is 55 dBA while nighttime value is set at 45 dBA. For industrial area the noise reference level is set at 70dBA.

Figure 18 gives the noise levels measured at the selected sites in the vicinity of the project area. These measurements were taken during mid-day to include ambient noise from traffic that is present in the vicinity in general. As stated in the traffic flow section, this area undergoes moderate traffic throughout the day and therefore noise pollution is reasonably high. When the traffic noise is included, the measurements exceeded the reference levels.

Figure 20 Noise pollution measured at specified locations shown.

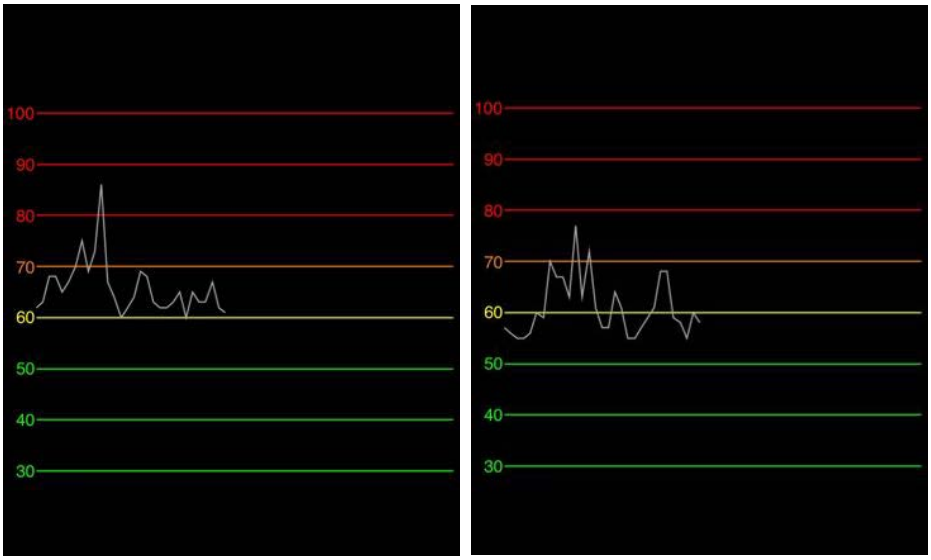


Figure 21 Noise Graph for 2 Sites near project area

3.6 Water quality

Ground water in the location was sampled and sent for testing to MWSC, on 1st September 2015. Results of this test are shown in Table 5 below (see Annex 4 for results sheet).

It is noted that the groundwater quality of Male' has deteriorated over the past several decades due to extraction of groundwater for several development projects such as water and sewerage and road construction projects, along with major building infrastructure project.

Due to overcrowding and congestion of Male' there is virtually no land to physically sink the water to the ground that is extracted from the dewatering process. It is expected that the dewatered water would be disposed to the temporary junction provided by MWSC, which disposes the water to the sea.

Table 5 Groundwater quality

	Unit	**Project Site**
GPS Location	-	4°10'26.70"N, 73°30'24.08"E
Conductivity	µs/cm	1837
Nitrate	mg/L	37.2
pH	-	7.42
Nitrogen Ammonia	mg/L	0.15
Sulphide	µg/L	<5
Salinity	‰	0.93
Phosphate	mg/L	0.12
Dissolved Oxygen	mg/L	6.13
Temperature	oC	22.5
Total Dissolved Solids	mg/L	919
Turbidity	NTU	1.88
Fecal Coliform	CFU/100ml	>2420

As seen from the results, the parameters from the project site show poor water quality. Electrical Conductivity is a very important parameter with regards to groundwater over extraction and increase in groundwater salinity. The EC value and Faecal Coliform value is very high.

3.7 Hazard Vulnerability

Maldives in general does not experience natural disasters and hazards on a frequent basis. However, the Indian Ocean Tsunami in 2004 was a momentous reminder on potential hazardous threats the country faces. The islands across Maldives face similar type of threats and hazards to varying degrees and magnitude depending on several factors.

The vulnerability of islands to natural hazards depends on geological and more importantly geographic aspects of the island. As such, the location of the island, with respect to the country and atoll is quite important. Likewise, the level of protection the island is offered from neighbouring islands, and the house reef, shape and orientation of the island are also important factors.

Based on the UNDP Disaster Risk Assessment Report of Maldives in 2006, Male' is located in an area that has been designated as a low-risk hazard zone. However, as stated in the report, sea level rise due to climate change is a uniform hazard throughout the country, and will have high impact on Male as well. Figure profiling the Maldives based on the hazard zones are given in Figure 20.

Local data on the hazard vulnerability of Male' cannot be taken within such a short period as has been for this EIA report. Long-term data on a local and regional scale is required to deduce such probabilities.

Manaage being located virtually at the centre of the island, any impact at the project site will be minimum compared to those at the island coast. However, in an event of a disaster such as a tsunami, where the impact will be felt throughout the island, the project site will also be vulnerable. It is worthwhile to note that the project area did not have any significant impact during 2004 Indian Ocean Tsunami.

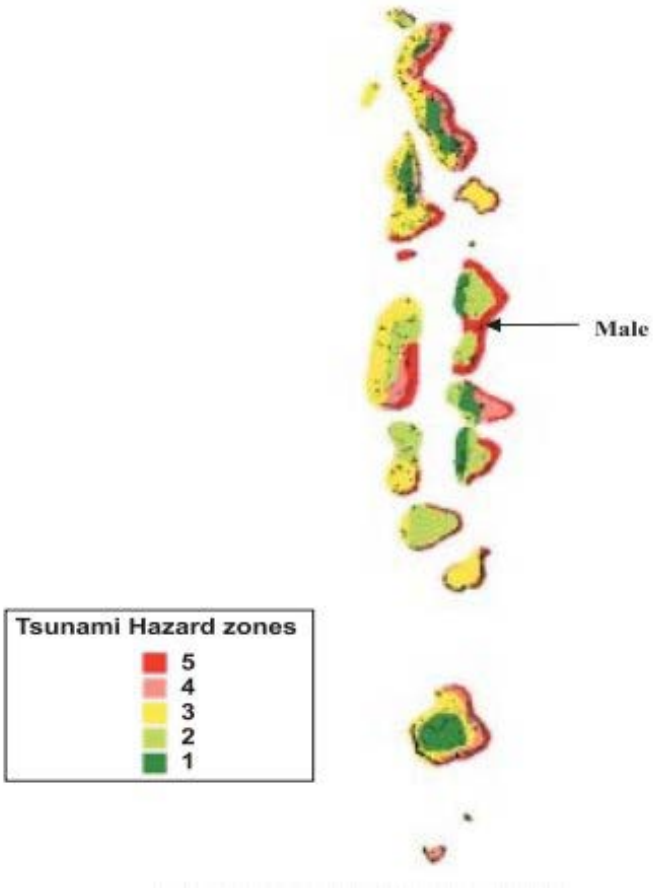


Figure 22 Disaster risk profile of the Maldives (UNDP, 2006)

4 Legislative and Regulatory Considerations

The legislative and regulatory consideration the project adheres to is mostly at a national level, since it takes place on a local scale within the Maldivian environment. The extent to which the project conforms to existing plans, policies, guidelines, regulations and laws of the Maldives are considered in this Section. Some of the more important regulations are stated within the context of this project scope. The regulatory context in which the project activities take place and the legal and policy aspects relevant to those activities will be discussed in the Section.

4.1 Environmental Protection and Preservation Act (Law No. 4/93)

There are few environmental policies; regulations and standards of specific relevance to coastal protection or environmental protection related to coastal protection activities. The major legal instrument relating to environmental protection is the Environmental Protection and Preservation Act (Law No. 4/93) of the Maldives passed by the Citizen's Majlis in April 1993. This Act provides the Ministry of Environment with wide statutory powers of environmental regulation and enforcement. This umbrella law covers issues such as environmental impact assessment, protected areas management and pollution prevention. The following clauses of the Environmental Protection and Preservation Act (Law No. 4/93) are relevant to the project:

Clause 5a: An impact assessment study shall be submitted to the Ministry of Environment, Energy and Water before implementing any development project that may have a potentially detrimental impact on the environment.

Clause 5b: The Ministry of Environment, Energy and Water shall formulate the guidelines for EIA and shall determine the projects that need such assessment as mentioned in paragraph (a) of this clause.

Clause 6: The Ministry of Environment, Energy and Water has the authority to terminate any project that has an undesirable impact on the environment. A project so terminated shall not receive any compensation.

Clause 9a: The penalty for minor offences in breach of this law or any regulations made under this law, shall be a fine ranging between Rf5.00 (five Rufiyaa) and Rf500.00 (five hundred Rufiyaa), depending on the actual gravity of the offence. The fine shall be levied by the Ministry of Environment, Energy and Water or by any other government authority designated by that Ministry.

Clause 9b: Except for those offences that are stated in (a) of this clause, all major offences under this law shall carry a fine of not more than Rf100,000,000.00 (one hundred million Rufiyaa), depending on the seriousness of the offence. The fine shall be levied by the Ministry of Environment, Energy and Water.

Clause 10: The government of the Maldives reserves the right to claim compensation for all damages that are caused by activities that are detrimental to the environment. This includes all activities mentioned in Clause No. 7 of this law as well as those activities that take place outside the projects that are identified here as environmentally damaging.

4.2 Regulation on Aggregate and Sand mining

This regulation addresses sand mining from uninhabited islands that have been leased; sand mining from the coastal zone of other uninhabited islands; and aggregate mining from uninhabited islands that have been leased and from the coastal zone of other uninhabited islands.

Coral mining from the house reef and the atoll rim has been banned through a directive from the President's Office dated 26th September 1990. Under Article 7 (c) of the Regulation on Sand and Coral Mining issued by the Ministry of Fisheries, Agriculture and Marine Resources (MOFAMR) on the 13th of March 2000, it is an offence to mine sand or coral from the beach, lagoon or reef of any inhabited island and islands leased for the purpose of building a tourist resort.

This regulation would not have any implication on the project, as manufactured sand will be used for the construction works.

4.3 EIA Regulations

The EIA Regulations, which initially came into force in May 2007 has been amended and re-published in May 2012 by the powers vested by the Environmental Protection and Preservation Act. The EIA Regulations have been the basis for Environmental Impact Assessment in the Maldives and since its inception; it had helped to improve the quality of EIAs undertaken in the country. Today, registered consultants are required to sign EIAs and the reports are subsequently reviewed by two independent reviewers and a final decision is made by EPA based on the reviews. Likewise, this EIA report would also be subject to these requirements and review criteria.

'Jadhuvalu Raa' of the new EIA Regulations lists the different environmental projects that require an Environmental Impact Assessment study. High rise building construction works is among this list and thus a full Environmental Impact Assessment was needed to be carried out for this project. The EIA Regulations sets out the requirements for the contents of Environmental Impact Assessment reports in 'Jadhuvalu Baa' and format for monitoring reports have been given in 'Jadhuvalu Laamu'. Therefore, these requirements have been taken into consideration in preparing this EIA report.

On 9th April 2013, a further amendment to the EIA Regulation 2012 has been published, which deals with repeated offenders of the regulation. Under Clause 20 of the regulation, the amendment proposes a new Schedule. 'Jadhuvalu Taviyani, which lists penalties for repeated offenders. Under 'Jadhuvalu Taviyani', repeated offenders of the regulation will be fined based on the following criteria

- For Initial offence: 20,000 MVR
- If an offence is repeated for the 2nd time: 60,000 MVR
- If an offence is repeated for the 3rd time: 120,000 MVR
- If an offence is repeated for more than 3 times: 200, 000 MVR for each offence.

4.4 Maldives National Building Act 2010

The Maldives National Building Code is currently at the draft stage. It recommends best practices, in addition to regulations to be adhered to during construction work. It covers aspects such as structural stability, fire safety, access, moisture control, durability, services and facilities, and energy efficiency. Once the building act is published, it will be enforced and all contractors will need to adhere to the regulations provided.

4.5 Waste Management Regulation, 2013

Waste Management Regulation (No. 2013/R-58) came into effect on 6 February 2014. The Regulation was gazetted on 05 August 2013. The regulation provides a set of comprehensive guidelines and on collecting, storing, transporting and managing waste as well as management of hazardous waste. The waste management regulation prohibits dumping of waste on to parks and roads; protected areas under the Environmental Protection and Preservation Act. Moreover, waste management regulation states that those involved in waste management must be permitted by the Environmental Protection Agency.

4.6 Dewatering Regulation,2013

A Dewatering Regulation (No. 2013/1697) came into effect in December 2013. The main purpose of the regulation is to protect groundwater resources found in the islands from impacts of dewatering, pollution and protect the environment from release of groundwater by dewatering. As per the regulation, a dewatering permit shall be obtained from EPA prior to any dewatering operations required for all development projects. Further, the regulation states that 30m radius boundary shall be considered as impact area from all dewatering operations and any entities within the boundary shall be informed 24hrs before the dewatering operation. EPA approved dewatering signage must be placed during the process of dewatering.

Dewatering can only be to be carried out, after gaining approval by submitting "the dewatering approval form" in the annex 1 of the Regulation to the enforcing body for approval with all the required documents expressed and with an administrative fee of 500 MVR. Water quality tests results also have to be submitted as one of the required component.

The regulation also guides on where and how the extracted water shall be disposed of, and how it has to be handled. According to the regulation, permission can be granted for dewatering at a stretch for a maximum of 28 days, for which a sum of 500 MVR should be paid per day. This amount is liable to be increased with the number of days increased.

4.7 Management, Use and Control of HCFC Substances Regulation, 2010

The HCFC Regulation is developed under the Environmental Protection and Preservation Act (4/93) towards regulating phasing out of import, use, selling of HCFC substances by 2011 and completely eliminating use of HCFC substances in the Maldives by 2020 through controlling importers, registering importers, establishment of a quota system, control mechanisms for selling, maintenance of import, selling, purchase and service providers statistics. This regulation is more relevant to the operational stage of the project

4.8 Maldivian Land Act, 2002

The Act governs the allocation of Maldivian land for different purposes and uses and other issues regarding the issuing of land, issuing of state dwellings for residential purposes, conduct regarding state dwellings or private dwellings constructed for residential purposes and the sale, transfer and lease of Maldivian Land.

In accordance with section 3 of this Act, land shall be allocated for the following purposes and uses: for the construction of households and buildings for residential purposes, for commercial use, for social use, for environmental protection and for government use.

4.9 Land Use Plan and Implementation Regulation

Under the Maldivian Land Act of 2002, all lands in the islands under the lands development policy, a Land Use Plan shall be developed and approved from Ministry of Housing and Infrastructure prior to use of the lands. The regulation outlines key aspects that need to considered while preparing land use plans as well as describes guidelines on developing and allocating lands for various purposes. In this regard, various categories of lands are identified under which a government agency shall implement the land use plan. However, for Male' the regulation has not been adhered to. There is no approved LUP for the island, by which land allocations are made and approvals given for land use.

4.10 Permits required for the Project

4.10.1 Design Approval

The floor plans and design has to be currently approved by the Ministry of Housing and Infrastructure (MHI). However, for this project design approvals have already been obtained from Male' City Council before EIA work commenced. In such cases, the client need not resubmit the drawings to MHI. Therefore, approval from the Male' City Council was obtained and is attached in the Annex 3.

4.10.2 Dewatering Permit

A dewatering permit shall be obtained from EPA prior to undertaking any dewatering works. Before dewatering approval is given, an EIA would need to be done if the project falls under 'Jadhuvalu R' of the EIA regulations.

4.10.3 EIA Decision Statement

A decision regarding this EIA from the Environmental Protection Agency (EPA) need to be obtained before construction commences. The EIA Decision Statement, as it is referred to, shall govern the manner in which the project activities must be undertaken. This EIA report assists decision makers in understanding the existing environment and potential impacts of the project. Therefore, the Decision Statement may only be given to the Proponent after a review of this document following which the EPA may request for further information or provide a decision if further information is not required.

5 Identification of Impacts & Significance

This section is based on the potential environmental impacts due to the project components including:

- Demolition
- Excavation and Dewatering
- Material sourcing, transport and storage
- Construction of the foundation
- Super structure construction and masonry works
- Waste management
- Establishment of utilities
- Building operation
- Building maintenance

The section describes the mitigation measures for each identified impact. Since the components are all building related some impacts are general to all the components of the project, and some are specific. Likewise, the same applies for the mitigation measures. Methods of identification of potential impacts and assessing the significance of the impacts are described in the following sections.

5.1 Identification of Impacts and their Significance

Impacts on the environment from various activities of the proposed project have been identified through:

- Public consultation with important stakeholders. Including during the scoping of the project and formulation of the Terms of Reference for the EIA.
- Using decision frameworks for assigning significance to impacts
- Existing environmental studies carried out similar developments in other similar environments
- Research data that has been accumulated specific to the Maldivian context.
- Baseline environmental conditions collected.
- Past experience of the consultants with similar projects.

Possible negative impacts on the environment have been considered in worst-case scenario to recommend mitigation measures in the best possible ways so that these impacts would be minimized and perhaps eliminated in the implementation phase.

The impacts highlighted in the TOR for this EIA has been used as a guideline in identifying important impacts. However, this was not used as a strict instruction for the identification. Once new impacts not highlighted in the TOR were foreseen, they were given equal importance.

Following are the major types of negative impacts foreseen due to the implementation of building construction projects in Male'

- Loss of visual amenity during demolition and construction
- Loss of vegetation and impact on terrestrial habitats
- Groundwater degradation
- Mosquito growth
- Noise Pollution
- Air Pollution
- Traffic disruption leading to congestion
- Generation of building and construction waste
- Impact on adjacent structures
- Health and safety of workers and neighbours

Figure 23 Project Impact Area

5.2 Description of Impacts

5.2.1 Loss of visual amenity during demolition and construction

The existing building has already been demolished. There are few high-rise buildings in the area, and the demolition works does not appear to have had any impact on these. Moreover, the site has been cleared and it seems demolition had taken place in a very orderly manner. Waste has been removed save for some few concrete blocks still in the land.

Maaveyo Magu in general provides some tranquillity and a classic outlook of Male' and the public has come to expect it in this area of the city. However, this outlook will be altered when construction commences in the area. Moreover, it would create some disturbances to the public to witness a construction site and the nuisances that arises due to it.

There is also the issue of whether construction of this site will hinder the visual impact of a cultural site or a site of national significance nearby. However, such a structure is not found within the project vicinity.

5.2.2 Loss of vegetation and impact on terrestrial habitats

The are surrounding the project site is a heavily built area much like the rest of Male'. There are no parks nearby. Therefore there is no significant natural vegetation found on site. However, Maaveyo Magu is famous for the vegetation on the roads. None of these vegetation should be impacted during construction.

5.2.3 Groundwater degradation

The major cause for concern with regards to groundwater is the water extraction process to lay the foundation, which is generally known as dewatering. Dewatering would remove a significant volume of water from the project site. This water will not be disposed anywhere on land and will not be used for groundwater recharge. It will be discharged to the lagoon using the existing MWSC drainage system. The impacts of the operation are however short term.

The short-term impacts due to dewatering is mainly the impact on the groundwater lens due to saline intrusion resulting from coning and the impact of such sudden increase in salinity on the freshwater lens in the vicinity of the site. As stated previously, there are no mature trees that will undergo an impact from this. It is not expected that the impact will be significant on the surrounding infrastructure in accordance with the permit given by Environmental Protection Agency. In any case, dewatering is an unavoidable component of the project. Likewise, the possibility of groundwater recharge also does not exist within a

heavily built area with poor drainage. Therefore the best existing option is to dispose the water to the sea/lagoon.

5.2.4 Mosquito growth

Mosquito growth has become a significant issue at all major construction sites, mostly due to negligence. After foundation is laid, and construction takes place at ground floor and beyond, the elevator pit is usually left without any such construction. As a result, water gets accumulated in the area; and if left untouched, provides a favourable environment for mosquito growth.

5.2.5 Noise Pollution

As stated previously under Description of the Environment, ambient noise pollution in the area is moderate - high due to relatively moderate traffic. Construction activities will nevertheless increase the amount of noise, especially during the demolition and concrete mixing operations. Also, there will be consistent noise emitted from Stationary equipment such as air compressors, cranes, and generators. They generally run continuously at relatively constant power and speed, although sound levels may vary according to the work cycle (e.g., loading). These types of noises are temporary and are relatively intermittent.

5.2.6 Air Pollution

Air pollution is an issue during demolition when debris maybe seen accumulating in the project area. Impact of debris on human health is significant. Pollutants will include dust from demolition, excavation, movement of transportation vehicles, loading and unloading of materials, earthwork and during concrete mixing work. Dusts may also be transported to surrounding areas by wind, affecting residents and workers of surrounding areas.

In addition to dusts and debris, harmful gases released by heavy machineries and vehicles and other construction work include carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. Other harmful gases can be released from vapors of oils, glues, thinners, paints and wood treatment during construction and interior finishing. These are all atmospheric pollutants and can also cause respiratory problems and other detrimental health issues upon repeated inhalation.

5.2.7 Traffic Congestion

From the nos. obtained during the observation of traffic, it can be seen that this project will have a significant impact on traffic in the area. There will inevitably be road closures at different times of the project, which would lead to worsening of the traffic issue. In addition

to road closures, the movement of heavy-duty vehicles such as cranes and excavators would also disrupt the traffic not only at the project site. Therefore, efficient traffic diversion is important for this project. From Section 2.9, it can be seen where road closures are going to take place. Due to the no. of vehicles using the area consistently, there will be congestion no matter which method is in place.

5.2.8 Generation of building and construction waste

There will be a significant volume of building and construction waste generated from a near 4000 sqft land area. Since the structure is quite old, no material from the existing structure will be used for the new building. This would result in a negative input to the environment and can be a nuisance to the neighbourhood. Construction waste such as wood, concrete, metals, bricks, plastic and domestic waste will be generated in addition to excavated waste and municipal waste. This impact will be felt especially during and straight after the demolition stage and is therefore short-tem.

5.2.9 Impact on adjacent structures

Male', being overcrowded as it is, structures are constructed side by side. This project site is no different as numerous structures are all around Ma. Manaage, with no significant high rise building nearby. There is some probability that there will be some impact on these structures especially during the dewatering process and foundation construction works. The impact will certainly not be as high as construction with deep piling. After the issues faced due to the construction of Holiday Inn building in Male' using this method, it is not currently practiced. Also, since the construction is taking place in Maaveyo Magu near the Maaveyo Magu – Muiveyo Magu junction, it is observed that adequate parking for mobile cranes will be available to an extent, and the boom of the crane could be moved at varying degrees without overlapping into adjacent properties.

The best way to avoid any claims in the future is to ensure the current status of the facilities. This can be done by carefully and properly investigating the structures before construction commences so that any potential defects can be compared to the pre-existing defects of the respective buildings. Although this is not strictly a mitigation measure, it is a necessary process to identify potential impacts. A visual defects inspection by a Civil Engineer is therefore highly recommended before project commencement. Such an assessment is important in order to establish the conditions of the buildings for structural monitoring purposes, in case if there is any failure as a result of undertaking this project. Avoiding all impact to neighbouring sites may not be possible, and under such circumstances compensation will need to be paid to the relevant landowners. It is worthwhile to note that

the proponent declared that 3rd party insurance will be taken for the project with respect to any damage that may occur from this project.

The site offset, foundation protection methods and shoring methods proposed for the project will ensure that the surrounding buildings will not be affected during construction of MA. Manaage, especially since similar methods have been used on numerous occasions in Male' with success. Therefore, with the effective mitigation measures in place, the impact on adjacent structures is expected to be low.

5.2.10 Health and Safety of workers and neighbours

Health and safety of workers and neighbours have been discussed to some extent under noise pollution and air pollution. As stated in the preceding sections, the construction site will indeed be a health hazard and care must be taken at all times while at or near the site. Moreover, in addition to impacts arising from noise and air pollution, there is also the significant possibility of direct impact from accidents from the work area. This could occur due to falling objects, misplaced equipment and materials, temporary structures not properly fixed, etc.

Awareness of the works on site is the first and foremost mitigation measure that can be taken to reduce any risk of accidents and other minor health impacts. For awareness, the commonly used method is to put up warning signs around the project area. These include 'Caution: Construction works in progress". "Warning: No entry beyond this point". "Wear Safety Hats", etc. Further to this, it is also recommended to send leaflets to neighbouring houses and shops to inform them of the construction work schedule and warn neighbours to stay away from the site while construction is in progress for their safety. Aside from awareness, second method is to encourage wearing safety cloths and equipment at the construction site at all times. This applies more to construction workers. As such, they should be instructed to wear safety helmets at all times, dust masks during sensitive work, conspicuous fluorescent cloths, earmuffs, etc.

5.2.11 Contribution to congestion in Male'

Male' is already among the most densely populated island cities in the world. Based on the 2006 census, the population density of Male' is 18,000/km^2. Currently over one third of the total population lives in Male'. It is a widely held belief that projects of these types contribute to the every increasing population in Male'. More housing have traditionally resulted in more migration to the capital city, and the process has continued to grow exponentially. While it is not the intention of the developer to encourage more migration to the city, it is very much an indirect impact from projects such as these.

Since there is no policy in place discouraging migration to Male', the process looks to continue for the foreseeable future. However, decentralisation is a key policy for all the major government stakeholders and policy makers and this has resulted in reducing the increase in the population density. One of the key actions for this has been the development of Hulhumale', a reclaimed island nearby, which has resulted in people moving to the island from Male'. From the developer's side, there is no measure that can be taken to mitigate this issue, and is really beyond the interests and abilities of the client.

5.3 Impact Significance Assessment

This section provides a summation of the impacts of the project components discussed above. The impacts of the project have been evaluated according to the criteria proposed by Posford Haskoning (2004). The decision framework is given in the following figure

In order to make the evaluation quantitative, the framework proposed by Haskoning has been modified. Spatial distribution of impact is also added in order to make the significance of the impacts more realistic. Scores are given for each impact once it is identified that the resource is vulnerable to the impact. Scores are based on the following factors.

- Sensitivity of Receptor
- Recoverability of Receptor
- Importance of Receptor
- Spatial Distribution of impact

The scales associated with the above criteria are given in the Table 6.

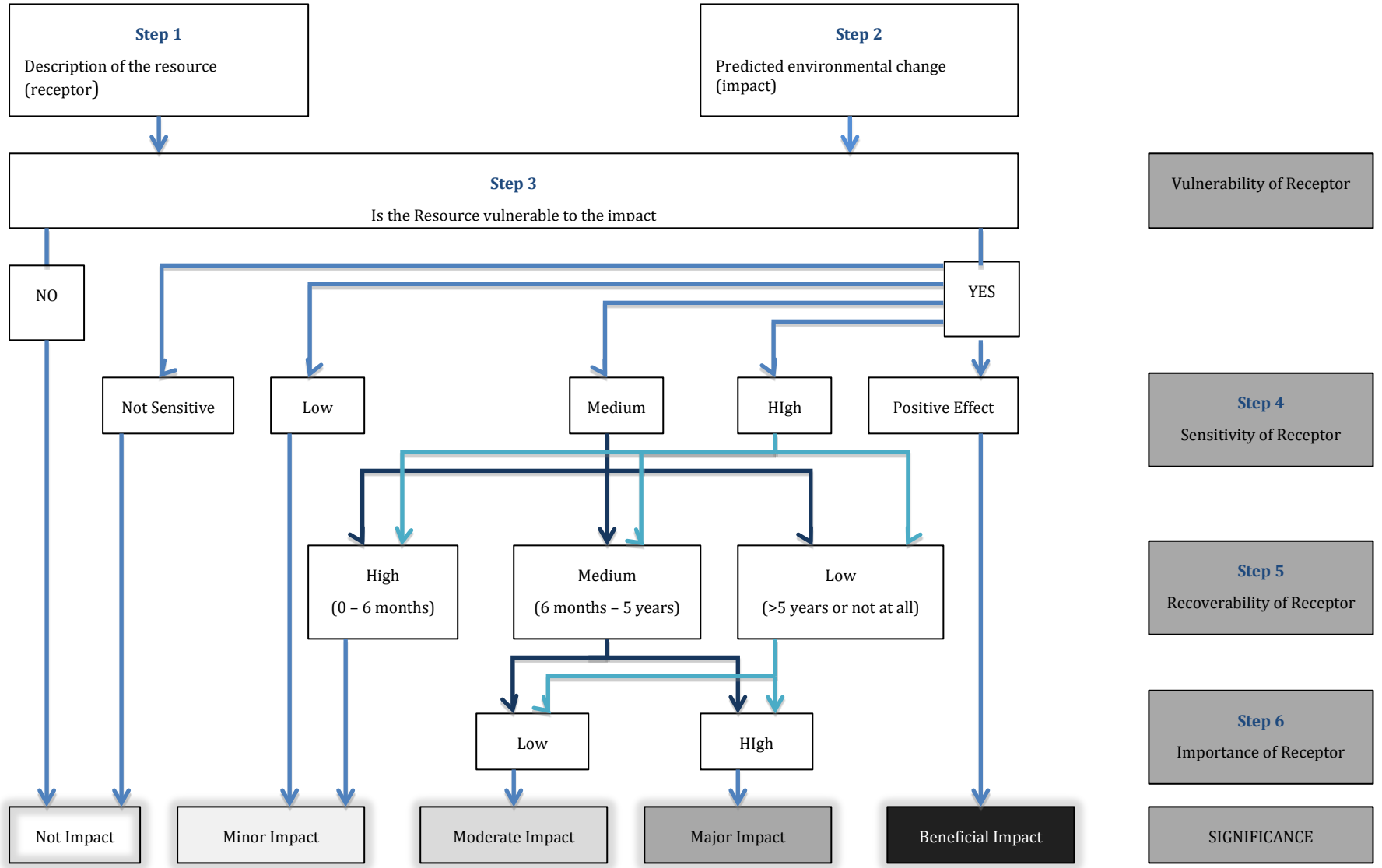

Step 1
Description of the resource (receptor)
Step 2
Predicted environmental change (impact)
Step 3
Is the Resource vulnerable to the impact
Vulnerability of Receptor
NO
YES
Not Sensitive
Low
Medium
HIgh
Positive Effect
Step 4
Sensitivity of Receptor
High (0 – 6 months)
Medium (6 months – 5 years)
Low (>5 years or not at all)
Step 5
Recoverability of Receptor
Low
HIgh
Step 6
Importance of Receptor
Not Impact
Minor Impact
Moderate Impact
Major Impact
Beneficial Impact
SIGNIFICANCE

Table 6 Impact Evaluation Criteria

Criteria	Scale	Attribute
Sensitivity *How sensitive the receptor is to the impact*	-1	Positive Effect
	0	Not sensitive
	1	Low
	2	Medium
	3	High
Recoverability *How long it would take for the receptor to recover from the impact*	1	Short
	2	Medium
	3	Non-recoverable
Importance *The importance of the receptor to the environment*	1	Low
	2	Medium
	3	High
Spatial Distribution *Distribution of impact*	1	local scale
	2	regional scale
	3	global scale

If the impact receives a -1, it deems the impact to have a positive effect on the receptor and the other criteria is then not applied. The impact is referred to as a Beneficial impact as is done by the Haskoning framework.

The significance of the negative impacts will be given based on the following range:

- 1 – 5 : Minor Impact
- 6 – 9 : Moderate Impact
- 10 – 12: Major Impact

Table 7 Analysis of potential impacts and their significance

Potential Impact	**Sensitivity**	**Recoverability**	**Importance**	**Spatial Distribution**	**Significance**
Loss of visual amenity during demolition and construction	2	1	1	1	5 (Minor)
Damage to roadside vegetation	1	3	3	1	8 (Moderate)
Air pollution during demolition and construction	3	1	2	2	8 (Moderate)
Groundwater degradation during dewatering.	1	1	2	1	5 (Minor)
Mosquito growth during dewatering stage, and at locations where structural construction is scheduled at a later stage	1	2	1	2	6 (Moderate)
Noise pollution during construction.	1	1	1	2	5 (Minor)

Disruption of regular traffic and traffic congestion	2	1	2	2	7 (Moderate)
Generation of waste oil and building and construction wastes	1	1	2	1	5 (Minor)
Structural impact on adjacent structures	1	1	3	1	7 (Moderate)
Health and safety of workers	2	3	2	1	6 (Moderate)
Health and safety of neighbours	2	3	2	2	9 (Moderate)
Indirect contribution to congestion in Male'	3	3	3	2	11 (Major)
Waste Generation during the operational stage of the project	3	2	2	1	8 (Moderate)
Indirect Economic impact on the community	-1				Beneficial
Alleviate housing issue currently faced in Male'	-1				Beneficial

The potential impacts, their significance and mitigation measures to be undertaken are given in **Error! Reference source not found.** for the construction and operation phase together since the components of the project are all continuous processes.

In conclusion, the project will have minor to moderate impacts on the environment. While some moderate impacts are important, probability of these impacts occurring is rather low including significant structural impact on adjacent structures.

The major negative impact the project would have on the environment is the project's indirect impact on contributing to the worsening congestion issue in the capital city. However, mitigating this impact is beyond the scope of the project and mitigation can only come from on a planning level by government authorities.

5.4 Uncertainties in Impact Prediction

The impact prediction has been carried out based on literature and tested methods. However, the prediction relies heavily on the judgement of the consultant, and would therefore lead to uncertainties. Alternatively, such projects as has been described in this report has been carried out on numerous occasions in Male'. Therefore, observing past literature on a local context, the uncertainty would be severely reduced. Based on this, the level of uncertainty in the case of the proposed project in Ma. Manaage may be expected to be low as similar projects in similar settings has been carried out.

Uncertainties will be further reduced by undertaking the monitoring program and re-analysing impacts, after comparing the monitoring data with the baseline data in this report and previous recent environmental studies done for Male'.

6 Environmental Management and Mitigation Measures

Mitigation measures are proposed where significant impacts are expected. Once an impact is identified to have 'moderate' or 'major' impact, appropriate mitigation measures are given for the project, if possible. Impacts such as the project contributing to the congestion in Male' will have no mitigation under the scope of this project.

Successful implementation of the measures given would lead to a major reduction and/or nullification of the impacts on the environment and thereby ensuring that the project is environmentally sustainable.

6.1 Loss of visual amenity during demolition and construction

Major impacts from the demolition generally arises due to poor project planning. To avoid loss of visual amenity and also other such minor impacts, it is recommended that the project site be hidden to the public by means of a temporary boundary wall straight after demolition. Warning signs should be placed which states that only staff is allowed within the boundary wall. The wall height should not be less than 10ft, and it could be made of wood or roofing materials.

6.2 Damage to roadside vegetation

It has to be ensured heavy and high vehicles do not impact on the roadside vegetation. It is recommended that vehicles with significant height access the project site from Ameenee Magu site rather than Majeedhee Magu. This would result in having to access the site opposite the one-way in Maaveyo Magu. However, necessary approvals from *AHBB* and traffic police can be obtained to provide this access route.

6.3 Mosquito growth

As a mitigation measure, some project managers put an oil layer on top to make the area inaccessible for mosquito growth. However, this also leads to groundwater contamination. It is recommended to put a wax layer on top of the area instead of an oil film. This practice is already carried out by some contractors and results have been positive. Any significant negative impact due to the wax layer is not currently known.

6.4 Noise Pollution

Noise protection gears such as ear muffs are to be used by workers on site. Components that require heavy vehicles such as casting of the slabs and columns are scheduled to be undertaken on weekends, during morning or at noon as to minimize the impact of noise to the shops, offices mosques. Works emitting noise at high decibels are not to be undertaken during night time. Furthermore, the boundary wall should be able to contain some amount of noise within the project site.

6.5 Air Pollution

For mitigation, dust screens and regular water spraying and dampening should also be practiced to reduce the spread of dust to surrounding areas. All heavy machineries should be inspected and fine-tuned to make sure the harmful gases released to the atmosphere do not exceed allowed standards. Building materials should be covered or

contained during loading, unloading and storage. The boundary wall or fence should also be able to restrict the movement of dusts and debris within the project site. Construction workers should wear dust masks during dust sensitive work.

6.6 Traffic Congestion

Permission will be obtained from the authorities before works commence in order to arrange road blocks and place relevant signboards and notices for pedestrians and drivers. The relative width of roads leading to site would accommodate movement of large vehicles at all times of day, as vehicles can take the outermost roads and eventually use Majeedhee Magu. Transport of such vehicles should also be undertaken during off peak hours. This would mitigate congestion during peak hours.

6.7 Generation of building and construction waste

It is recommended to re-use as much construction waste as possible, although this may be difficult to manage. The reusable waste includes wood and blocks. Metals can be recycled, and a recycling group such as Secure Bag can be contacted to remove such materials. All such recyclable or reusable wastes should be segregated on site. Waste that cannot be reused or recycled (which will be in the majority) are to be taken away from site for disposal. Such waste will be taken straight to the building and construction waste, landfill in Male'. Male' City council will later transport the waste to Thilafushi. Reusing formwork material as much as possible is another measure that can be taken to reduce waste.

6.8 Impact on adjacent structures

For mitigation, soft/silent piling can be used, which would be approximately 6m of piles at regular intervals around the land plot for retaining the earth to a depth of 10 metres below the ground level. The piles would be driven into the ground to hold the boundary wall that would be constructed for the shoring of the foundation. As added horizontal protection, the compacted soil should be placed along the periphery of the construction area, preferably in gunny bags, to minimize stress and risk of overturning. The construction methodology adopted for the proposed project has been decided in order to minimise the impact on the adjacent buildings. Unlike the deep pile foundation, the raft foundation is shallow and does not require deep piling.

Furthermore, it is recommended that dewatering will be timed when rainfall is less or there is no rainfall (NE monsoon). This is to avoid rainwater percolating into the soil beneath the foundations of adjacent buildings. If rain does occur, measures should be

taken to reduce the amount of water to the site, as the water particles may loosen the soil reducing its shear strength.

6.9 Health and Safety of workers and neighbours

Awareness of the works on site is the first and foremost mitigation measure that can be taken to reduce any risk of accidents and other minor health impacts. For awareness, the commonly used method is to put up warning signs around the project area. These include:

'Caution: Construction works in progress".

"Warning: No entry beyond this point".

"Wear Safety Hats", etc.

Further to this, it is also recommended to send leaflets to neighbouring houses and shops to inform them of the construction work schedule and warn neighbours to stay away from the site while construction is in progress for their safety. Aside from awareness, second method is to encourage wearing safety cloths and equipment at the construction site at all times. This applies more to construction workers. As such, they should be instructed to wear safety helmets at all times, dust masks during sensitive work, conspicuous fluorescent cloths, earmuffs, etc.

6.10 Waste Management

Waste management is the main issue during the operational stage of the project. A large number of wastes will be generated from 39 apartments in a concentrated area. Currently the proponent has proposed a chute system for all wastes including recyclables and non-recyclables. Waste will be collected in ground floor and arrangements will be made with a waste transporter to transport waste to Male' waste yard.

In addition to the general waste management method, it is recommended to separate recyclables from non-recyclables. This will reduce the total no. of waste produced and the system will be easier to manage ensuring sustainability.

Furthermore, it is recommended for the developer to put in place a system for hazardous wastes and large waste collection. It is recommended to collect such large wastes on a quarterly basis.

Table 8 Mitigation management plan summary

Mitigation measures	Implementing Responsibility	Implementing Stage	Cost
Demolition			
Site is to be demarcated and boundary walls of approximately 6ft high are to be put in place straight after demolition	Project Manager	Demolition	~35,000
Ensure no material gets deposited outside project boundary	Project Manager	Demolition	0
All waste to be removed from site on a daily basis	Project Engineer	Demolition	~25,000
Ground water degradation			
Dispose water to the sea or lagoon due to lack of other practical options for groundwater recharge in Male'.	MWSC	Construction	na
Regular monitoring of groundwater condition on site	Project Engineer	Construction	1000/test
Damage to roadside vegetation			
Divert traffic of vehicles with significant height to ensure they do not interact the with the vegetation along the route to the project site.	Project Manager	Construction	0
Mosquito Growth			
Ensure still water does not remain on site	Site Supervisor	Construction	na
Place a layer of wax on top of area in which water is prone to accumulate.	Site Supervisor	Construction	na
Noise Pollution			
For workers, use of earmuffs at construction site.	Project Manager	Design	In project cost
Construction to be scheduled in such a way that noise pollution will be at a minimum to the public. As such, works such as casting of slab and column are scheduled to be undertaken on weekends, during morning or at noon to minimize impact on the numerous shops nearby and mosques. Such works are not to be undertaken during night time after 8pm under any condition.	Project Manager & Site supervisor	Design and Construction	In Project cost
Ensure proper site demarcation and boundary wall condition before commencing such work	Site supervisor	Construction	In Project cost
Air Pollution			
Workers should be made to wear dust marks during dust sensitive work.	Project Manager	Construction	In Project cost
Place dust screens demarking the concrete mixer	Project Manager	Construction	In project cost

Daily water spraying and dampening to reduce spread of dust to surrounding areas.	Site Supervisor	Construction	In Project cost
Inspect and fine-tune all machinery and vehicles before work commencement to ensure harmful gases released to atmosphere are at a minimum.	Site Engineer	Construction	In Project cost
Cover building materials such as cement and sand, and should be contained during loading, unloading and storage.	Site Engineer	Construction	In project cost
Traffic Congestion			
Schedule transport of heavy-duty vehicles to site during off peak hours such as the morning.	Project Manager	Construction	0
Upon closure of the road, divert the traffic through so that vehicles can go around the project area.	AHBB	Construction	0
Generation of building and construction waste			
Re-use construction waste where possible. Reusable waste could potentially be wood and blocks found on site.	Project Engineer	Construction	0
Metals are to be collected separately and handed over or sold to a metal recycling group.	Site supervisor	Construction	0
All waste should be segregated on site.	Site supervisor	Construction	5,000
During and straight after demolition works, all waste that cannot be recycled or reused, are to be transported daily to the waste disposal site in Male'	Site supervisor	Construction	In Project cost
Reusing formwork material as much as possible.	Site supervisor	Construction	**0**
Impact on adjacent structures			
Undertake a defects inspection survey of structures above 2 storeys within the same block to verify the existing condition of these structures.	Project Engineer	Construction	30,000
Prepare and establish a budget of 10% of the project value before project commencement to provide compensation to neighbors in the event of damage to a nearby structure or take 3rd party insurance.	Project Manager	Construction	In Project cost
Soft/silent piling is recommended to be used as foundation protection, which would be approximately 6m of piles at regular intervals around the land plot for retaining the earth to a depth of 10 metres below the ground level. The piles would be driven into the ground to hold the boundary wall that would be constructed for the shoring of the foundation.	Project Engineer	Construction	In Project cost
Compacted soil should be placed along the periphery of the construction area, preferably in gunny bags, to minimize stress and risk of overturning of nearby boundary walls.	Site Supervisor	Construction	In Project cost
Dewatering will be timed when rainfall is less or there is no rainfall (NE monsoon). This is to avoid rainwater percolating into the soil beneath the foundations of adjacent buildings.	Project Manager	Construction	In Project cost
If rain does occur, measures should be taken to reduce the amount of water to the site, as the water particles may loosen	Site Supervisor	Construction	0

the soil reducing its shear strength			
Health and safety of workers and neighbors			
Undertake health and safety training for workers before project commencement.	**Project Manager**	**Pre-Construction**	In Project cost
Put up warning signs around the project area including signs indicating ongoing works, and restricting entry into the project area, and signs reminding the use of safety gear at site.	**Project Manager**	**Construction**	In Project cost
Encourage use of safety cloth and equipment at the site at all times. These include safety helmets, dust masks, conspicuous fluorescent cloths, earmuffs, safety shoes, etc.	**Project Manager**	**Construction**	In Project cost
Generation of household wastes			
Separate collection of recyclables and non-recyclables at the building and transport the waste	**Site Supervisor**	**Operation**	In Project cost
Collect hazardous wastes on a separate schedule.	**Site Supervisor**	**Operation**	In Project cost
Have a quarterly large waste collection schedule in place	**Site Supervisor**	**Operation**	In Project cost

7 Alternatives

This section looks at different alternatives for the proposed project. The main alternative is the no project option. After extensive discussion of this alternative, then options for the project components are investigated. Alternatives are given for each component based on location and design. Each alternative is discussed based on economic, social, and environmental factors. Finally, the recommended alternatives are suggested to assist in the project decision-making process.

These alternatives are not as intensively investigated as the original scope of the project. However, investigating and discussing alternatives is important so that it is ensured that the best available option(s) is/are chosen to solve the issues/problems of the project.

7.1 No project option

Initially the no project option is discussed in order to hypothesise whether the project should be taking place first of all. Sometimes, projects are proposed without much thought given to the socio-economic motivation of such development and the unnecessary impacts it may have on the environment, especially those that are long term. Therefore carrying out this exercise is important to avoid such a scenario and to ensure that undertaking this project at this stage makes good socio-economic sense without any significant impact on the environment.

The advantages and disadvantages of not undertaking each project component is given below.

Table 9 Advantages and Disadvantages of the no project option

Advantages	Disadvantages
Will not contribute to groundwater degradation	Will be a missed opportunity for the developers to develop their land and increase the value of their land
Will not lead to health and safety concerns at project site	Will not be able to alleviate the issue of people living in small crowded places in Male'
Will not contribute to structural issues of	Will lead to residents of the existing

neighboring buildings.	structure to continue living in an old structure prone to accidents
Will not cause any noise and air pollution at project location	Will decrease economic opportunities for construction companies and their employees
Will not cause any traffic disruptions	
Will not have any contribution to the increasing population in Male'	

A comparison of the no project option with the project going ahead as proposed, indicate that the no-project option is practicable, and environmentally favourable but involves massive losses to the developers. The other major disadvantage of the no project option is that in such a case, there won't be further housing options for people living in crowded areas in Male'. However, on the other side, it may also discourage more people migrating to Male', thereby increasing the population of the already dense city. However, this is a very indirect effect, the scope of which is outside this project, as the developers cannot in any way influence this socio-economic behaviour.

There are a few advantages of the no project option from an environmental perspective. However, local environmental impact from this project is small in nature, and the advantages stated is not significant, since most of the environmental impacts can be properly mitigated. Alternatives for components of the project are discussed further.

7.2 Project Alternatives

The Proponent initially decided that the best option not encompassing excessive costs would be adopted after evaluating different options. Therefore, the different alternatives for the project components were considered before finalising a particular option. Alternative options; mainly based on design and methodology for the construction are given below.

7.2.1 Project Location

Alternative locations are not as important for this project, as the location cannot be changed under any circumstances. The government could provide the developers with

an alternative land of similar size from a similarly lucrative location in Maldives. However, there is currently no such program and the practicality of such a shift in location is questionable. Proceeding with the construction in this exact location will be the most favourable for the developers.

7.2.2 Project design

Several component of the project design can be changed, taking the community more into consideration, such as:

Making space for a mini mall for the first 4 or 5 floors so that it would provided more vertical shopping space for Male'. Vertical development is important since it would encourage shop goers to get concentrated to particular areas, rather than spread out into the streets in Male' making them crowded & disrupting traffic.

Provide a larger parking space within the building, as the area is currently very congested with plenty of vehicles parked illegally due to virtually non-existent parking space available. Providing such a space in the building will be an important service to the community, and assisting to alleviate the crowding issue. .

Design for a rooftop garden area, alongside the swimming pool, instead of an empty terrace, which will contribute to making the city greener, while continuing with the infrastructure development in the given area.

These project designs are given as suggestions, the feasibility of which the developer should take into consideration before implementation.

7.2.3 Foundation

A deep pile foundation can be constructed, which will likely provide more stability to the 14 storey structure in the long term. However, the city have had to endure some negative experiences with deep piled structures, most notably that of the Traders building (formerly Holiday Inn) at Athireege Aage. For the structure, metal load bearing piles were driven to depths of 30 to 40 metres. The deep piling, lead to several neighbours complaining of tremors and cracks in their walls. Due to the close proximity of buildings structures, use of deep pile technology may not be ideal for high rise buildings in Male'.

8 Stakeholder Consultations

Stakeholder consultations were carried out with the construction management team of Rainbow Construction Pvt. Ltd. Officials from the Environmental Protection Agency were also met for consultation. The EIA scoping meeting held at Environmental Protection Agency provided a good opportunity to discuss issues with all the major stakeholders present and thus a significant portion of the consultation was carried out at the meeting. Further consultations were carried out with the Project Engineer and Project Manager for the project, and Assistant Engineer from Ministry of Housing and Infrastructure.

Table 10 Important stakeholders met during the consultation process

Name	Office	Phone No.	Designation
Mazin Ibrahim Rafeeq	Rainbow Construction Pvt. Ltd. (developer)	3340461	Director
Mohamed Afrah	Rainbow Construction Pvt. Ltd. (developer)	7771364	Project Manager
Shifaz Ali	Project Engineer	7778793	Engineer
Mohamed Didi	Ministry of Housing and Infrastructure	3004340	Engineer

8.1 Consultations with the Developer

Numerous consultations were undertaken with the developer to ensure the details of the project components. Consultations were also important in order to identify the most environmentally sensitive components and discuss potential mitigation measures. The developer ensured that the well-being of the surrounding environment will be given priority and as such an effective waste management system will be place. Moreover, they have plans to further improve the waste management of the building after observing the tenants practices during operation.

In addition to waste management the developer also stressed on the importance they give to the health and safety procedures for both staff and general public.

The concerns raised by the developer included the time delays for project component approvals from the government and discussed on the need to expedite bureaucratic processes. As such, Environmental Impact Assessment approvals were also discussed.

The developer further gave their assurance that this project will go ahead as planned and that they do not anticipate much delays during the course of the project.

8.2 Project Engineer

Stability of the structure and nearby properties were mainly discussed with the project engineer. The engineer informed that the current foundation design as proposed for this project has been tried and tested in the Maldives environment with good success. Moreover, since there is an offset of 1m from the nearest building, the engineer does not anticipate any significant impact on adjacent properties.

Vegetation within the vicinity of the project works was also discussed. The engineer gave assurances that there will be no damage to nearby trees in Maaveyomagu during the construction activities. He informed, that since heavy duty vehicles with heights greater than the trees, there will not be any significant damage. Therefore, vehicles should be able to access the site without any damage.

Among the concerns the engineer had, was delays to project commencement, effective project management and supervision on site and on site safety.

8.3 Ministry of Housing and Infrastructure

The Ministry informed that under recent changes, Male' City Council currently has no role to play in developments in Male'. The unit that was undertaking building and land approvals now come under the Land and Building Department under the Ministry of Housing and Infrastructure.

With regards to safety on site the Ministry informed that they are getting more strict with site supervisions to ensure the safety of the public both during construction and operations of the project.

The structure and architectural works for the project are to be undertaken by consultants registered at the Ministry. The foundation protection method along with other structures will need to be certified by these registered licenced consultants.

The Ministry informed that they do not have any further concerns if the necessary approvals for the project have been obtained.

9 Environmental Monitoring

This section deals with the Environmental Management and Monitoring plan for MA. Manaage building construction project with respect to the developments proposed in this EIA. The proposed monitoring plan is for the construction and operation phase of the project. The data collected for this assessment will be used as baseline data while undertaking the monitoring plan. Undertaking environmental monitoring is essential for several reasons including:

- To ensure that potential impacts are minimized and to mitigate unanticipated impacts.
- To aid in impact management,
- To improve impact prediction and mitigation methods.
- To gather long term data to minimise uncertainty
- To ensure sustainable development

Environmental monitoring has traditionally been a component that has been overlooked by most proponents. Proponents claim that this is mainly due to difficulty in making arrangements with the environmental consultants on a long-term basis and making arrangement for each monitoring is difficult since monitoring plans are given for a long term. Currently, environmental monitoring does not appear to be cost effective from the proponent's point of view and is generally viewed as a burden. However in order to make the best use of this report and for the aforementioned reasons, carrying out the monitoring plan as outlined is vital, especially for a continuous project such as this.

The proposed monitoring programme will yield beneficial results if it is undertaken for a long period. As required in the TOR, the monitoring is to take place during the construction phase once every 3 months up to 1 year, and then on an annual basis for 5 years.

The proponent expressed their full commitment to carry out the monitoring program outlined in this report. The proponent's commitment to undertake the environmental monitoring and mitigation measures is given in the Annex 7.

9.1 Monitoring Methodology and Costs

The methodology used for monitoring will be similar if not the same as those used in this environmental assessment. However, field water quality testing equipment can be employed to decrease the uncertainties of the results as they can be compared to those

obtained from the Laboratory from MWSC. To carry out field water testing, such equipment needs to be procured, which may not be feasible based on this project alone. However, considering the many other projects that would be carried out by the developer, procurement of such equipment makes more economic sense.

Cost estimates for environmental monitoring were usually given in previous EIAs based on the components that require monitoring. However, this was not seen as an efficient method and it tended to give high overall cost estimates to proponents and how much the proponent would need to spend to generate an annual monitoring report was not clear. As a result, more often than not, it discourages the proponent from attending to the monitoring program. Generally the components that require monitoring can be done simultaneously and therefore estimated costs are given based on the activities that need to be carried out to compile an effective monitoring report.

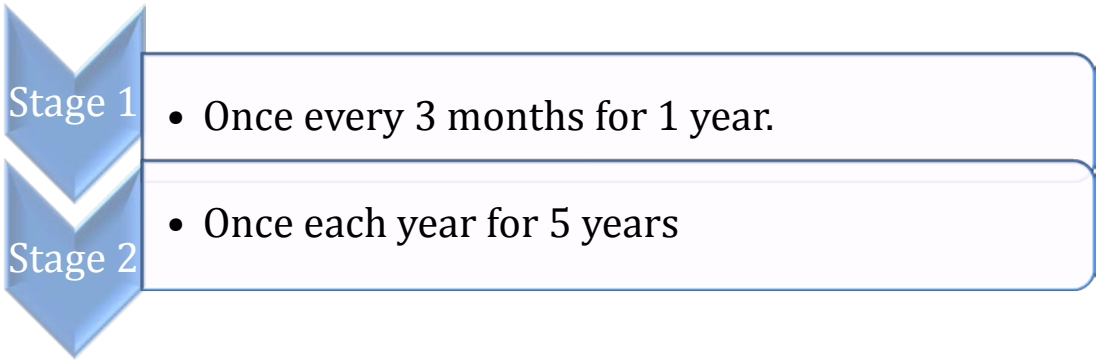
The costs given in Table , and Table are calculated for monitoring to be undertaken by hiring environmental consultants for each monitoring program. However, field data collected for the proposed environmental monitoring program can be carried out by an in house team of engineers and/or technical assistants since most of the parameters are to be investigated monthly and quarterly, and therefore hiring a consultant for each occasion may not be feasible. Nevertheless, if the contractor does not employ environmental experts among its staff, it is highly recommended that an arrangement is made with an environmental consultant on a long term basis to carry out and supervise the execution of the monitoring program. Additionally, it is an EPA requirement that the annual environmental monitoring report needs to be compiled and formulated by a registered environmental consultant with a **permanent** EIA consultant license.

The parameters that are most relevant for monitoring the impacts that may arise from the project are included in the monitoring plan. Therefore, the monitoring programme will cover the following aspects of the project:

- Ground water quality
- Defects in neighbouring structures
- Generation of wastes
- Noise pollution
- Traffic congestion

9.2 Recommended Monitoring Programme

As instructed in the TOR, the monitoring programme will be divided into 2 stages.



Stage 1

- Ground water quality for pH, temperature, EC, and salinity at project site
- Determine number, type and respective quantity of waste produced
- Noise measurement
- Survey the traffic within the same area as undertaken for this EIA

Stage 2

- Ground water quality for pH, temperature, EC, and salinity at project site
- Determine number, type and respective quantity of waste produced
- Noise measurement
- Determine quantity of accidents if any had occurred
- Survey the traffic within the same area as undertaken for this EIA

9.3 Cost of monitoring

The following tables outline the cost estimate for each stage of the monitoring plan given. The costs are calculated assuming the monitoring will be undertaken by hiring environmental consultants on a project basis. Since this monitoring is in Male' and

does not involve expensive surveying equipment, and most are based on visual observation and consultation, the overall cost is low relative to most monitoring programs.

Table 11 Estimated costs of Stage 1 Monitoring Programme

Item No.	Details	Unit cost (US$)	Frequency	Total (US$)
1	Field allowance for 1 consultants for 1 day	75.0	4	300.00
2	Surveying and monitoring equipment depreciation	50.00	4	200.00
3	Laboratory charges	110.00	4	440.00
4	Compliance reporting (annual report)	800.00	1	800.00
	Total			**1740.00**

The monitoring is for a period of 1 year, where data is collected quarterly.

Table 12 Estimated costs of Stage 2 Monitoring Programme

Item No.	Details	Unit cost (US$)	Frequency	Total (US$)
1	Field allowance for 1 consultants for 1 day	75.00	5	375.00
2	Surveying and monitoring equipment depreciation	50.00	5	250.00
3	Laboratory charges	110.00	5	550.00
4	Compliance reporting (annual report)	800.00	5	4000.00
	Total for 5 years			**5175.00**

This monitoring is for a period of 5 years, where a data is collected annually. Therefore for each year the cost will be approximately USD 1035.00, not taking into account any effects of inflation and other such economic scenarios. Considering the 2

stages of monitoring, monitoring costs in the first year would be approximately **USD 1740.00**. The proponent has to endure the greatest cost during the first year, as frequency of monitoring is greater. However, in the following years the frequency considerably decreases.

Please note that the costs are subjective. It may vary depending on the consultant and also due to changes in price with time. Also, in the case that a long term arrangement is made with a consultant, the price may considerably decrease and may be more feasible for the proponent.

9.4 Monitoring Report

Monitoring report should be compiled based on the baseline data collected. This report should be submitted to the EPA and any other relevant government agencies for compliance, if requested. The report structure may include but not limited to;

- Introduction
- Details of the site at the time of investigation,
- Data collection and analysis,
- Details of methodologies and protocols followed
- Quality control measures,
- Sampling frequency and monitoring analysis
- Conclusion and recommendations

10 Conclusion

With the continued problem of land scarcity faced in the capital city, Male', projects of this nature is now inevitable in the island. The question on more high-rise buildings is not of if, but when, as more and more developers focus on vertical development. This land scarcity issue had also exponentially increased the cost of land in Male', and therefore it is very financially attractive for developers to invest huge sums to construct such large structures. Approval for the construction is obtained without many issues if the land area and neighbouring sites are favourable for development, as in the case with MA. Manaage.

From a regional environmental perspective, Male' is in quite a poor state. From a land use perspective, more parks and empty areas is what is required to make the city more liveable and less crowded. However, specific developments such as these cannot be stopped or altered on this basis. Such restrictions would need to come at a policy level. Looking at the norms and trend of development in Male', it can be argued that this project alone will contribute little to an already bad situation. From this projects perspective alone, the environmental impacts from the project is minor to moderate and can be easily mitigated. Apart from an indirect contribution to congestion at ground level, the only real concern is the impact on neighbouring building due to the construction of this new building. However the probability of any significant impact occurring is low, while this can be mitigated by providing adequate foundation protection and other such measures as provided in this report and as already planned to be undertaken as part of the project

All the impacts as highlighted in the project can be mitigated. The socio economic benefits to the developer and also to the area are reasonably high. It also provides additional housing opportunities, which would contribute to alleviating the housing issues in Male'. Therefore, after consideration of all these perspectives, it is recommended that this project proceed as planned.

It is also recommended that restrictions for such developments in Male' come at a policy level in the near future, and especially government funded big apartment buildings are located elsewhere other than the capital city to decrease the worsening congestion issue.

It is recommended for the project to proceed as planned after incorporating the mitigation measures given in this study with the commitment to implementing the monitoring plan given.

11 References

CDE 2015, EIA for 11 Storey building construction in M. Thulhaadhooge, Male' City, Maldives

Department of Meteorology (Republic of Maldives), accessed 02/08/2015. www.meteorology.gov.mv

Horodecki, G.A. and Dembicki, E. (2012), Impact of deep excavation on nearby urban area

Maldives M.M.S (2012). *Severe Weather Forecasting, Report submitted to WMO*, Maldives Meteorological Service, Jan 2012.

Ministry of Housing and Environment 2011, Survey of Climate Change Adaptation Measures in the Maldives, Integration of Climate Change Risks into Resilient Island Planning in the Maldives Project, Version 2.

Ministry of Housing, Transport and Environment (2009), Third National Environment Action Plan - 2009-2013,

Morris P & Therivel, R (ed.) 2009, *Methods of Environmental Impact Assessment*, 3rd edn, Routledge, London; New York.

Musthafa, A. (2013), EIA for proposed 14-storey building at G. Hudhukokaa, Malé

UNDP 2006, *Developing a Disaster Risk Profile for Maldives*, Male', United Nations Development Programme and Government of Maldives.

USACE 2001, *US Army Coastal Engineering Manual*, USACE

Sandcays 2015, Environment Impact Assessment Multi Storey Building at H. Point Villa, Male' City, Maldives

Rincon Consultants Inc 2004, Viginia Court Condominium Project Final Environment Impact Report

Pal, B. K., Dey, K. and Tandia, P. K. (2010), Vibrations on structures and soils due to industrial activities: unique case studies. In *Journal of Environmental Research And Development* **4** (3)

Annex 1 – Terms of Reference

Annex 2 –Site layout

Annex 3 – Design approval from Male' City Council

Annex 4 – Water test results

Annex 5 – Work schedule

Annex 6 – Foundation design and section drawings

Annex 7 – Proponents Commitment for Monitoring and Mitigation

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EPA/ToR/2015/140

Terms of Reference for Environmental Impact Assessment for a Building Construction Project

The following is the Terms of Reference (ToR) following the scoping meeting held on *14/09/2015* for undertaking the EIA of the proposed 14Storey Building Construction at Ma. Manaage, Male'. While every attempt has been made to ensure that this TOR addresses all of the major issues associated with development proposal, they are not necessarily exhaustive. They should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIA report.

1. **Introduction to the project** –Describe the purpose of the project and, if applicable, the background of the project and the tasks already completed. Clearly identify the rationale and objectives to enable the formulation of alternatives. Define the arrangements required for the environmental assessment and if relevant, including how work carried out under this contract is linked and sequenced with other projects executed by other consultants, and how coordination between other consultants, contractors and government institutions will be carried out. List the donors and the institutions the consultant will be coordinating with and the methodologies used.

2. **Study area** – Submit an A3 size scaled plan with indications of all the proposed land infrastructures. Specify the boundaries of the study area for the environmental impact assessment highlighting the location and size of the proposed construction. The study area should include nearby environmentally sensitive areas. Justification for site selection is required. Relevant developments in the areas must also be addressed including residential areas, all economic ventures and cultural sites.

3. **Scope of work**– Identify and number tasks of the project including site preparation, construction and decommissioning phases.

   Task 1. Description of the proposed project – Provide a full description and justification of the relevant parts of the project, using maps at appropriate scales where necessary. All inputs and outputs related to the proposed activities shall be justified.

   1. Provide a clearly labeled concept design and scaled site plan of the project boundary.
   2. Submit a detailed description of the components of the project and how the project activities will be undertaken.
   3. A project schedule should be included.
   4. A matrix of inputs and outputs related to the proposed activities shall be included
   5. Need and justification for the proposed project
   6. Waste management during construction period including construction waste, demolition waste, and green waste where applicable.
   7. Dewatering plan
   8. Description of any underground structures such as basement or wells.
   9. Plans for road closures during construction
   10. Details of vegetation clearance if any
   11. Use of any energy conserving utilities
   12. Details of the back up generator to be installed

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13. Estimated consumption of water and electricity and their sources

Project management: Include communication of construction details, progress, target dates and duration of works, construction/operation/closure of labor camps, access to site, safety, equipment and material storage, water supply, waste management from construction operations, power and fuel supply for backup generators;

Task 2. Description of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area and timing of the project(e.g. monsoon season). Identify baseline data gaps and identify studies and the level of detail to be carried out by consultant. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that data collected is suitable for use as a baseline. As such all baseline data must be presented in such a way that they will be usefully applied to future monitoring. The report should outline detailed methodology of data collection utilized.

The baseline data will be collected before construction and from at least two benchmarks. All survey locations shall be referenced including water-sampling points.

Physical and Biological Environment
Noise levels in the vicinity of the site including any noise sensitive location
Traffic flow (size and direction) around the project site
Vegetation in the project site and major trees around it
Water quality of groundwater wells in project site. Following parameters are to be tested: Electrical Conductivity, pH, salinity, turbidity, phosphate, nitrate, sulphide, DO, TDS and faecal coliform

Built Environment
Nature of adjacent buildings
Condition of the surrounding roads
Existing structure/uses of the proposed site
Public facilities nearby

Socio-economic Environment
Demographic data for Male'
Brief description of social environment of Male' in general and adjacent residential units in particular
Identify types of vehicles and peak traffic hours in or near the project site

Task 3. Legislative and regulatory considerations – Identify the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project, and identify the appropriate authority jurisdictions that will specifically apply to the project. The report should clearly identify the different articles and clauses that apply to the said project and should state how the project meets these requirements. Include the following permits and approvals in the EIA document:

a. Approval from Ministry of Housing or registered engineer/architect
b. Approval from City Council

Task 4. Potential impacts (environmental and socio-cultural) of proposed project, incl. all stages – The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

- Loss of vegetation if any
- Loss of visual amenity
- Land preparation and piling works if any

- Impacts on ground water table and water quality
- Impacts related to construction works on land including materials sourcing, transport and storage, building construction methodology and piling.
- Mosquito growth
- Noise, fugitive dust, traffic obstruction and other impacts related to traffic due to the project
- Impacts due to generation of waste
- Potential impacts of the development on adjacent properties and residential areas, especially sensitive areas like schools, pre-schools and mosques.
- Safety and security of the building
- Risk of accidents to workers and public
- Impacts on employment and income such as job opportunities
- Disturbances to residents and public facilities/activities nearby

The methods used to identify the significance of the impacts shall be outlined. One or more of the following methods must be utilized in determining impacts; checklists, matrices, overlays, networks, expert systems and professional judgment. Justification must be provided to the selected methodologies. The report should outline the uncertainties in impact prediction and also outline all positive and negative/short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 5. Alternatives to proposed project – Describe alternatives including the *"no action option"* should be presented. Determine the best practical environmental options.Alternatives examined for the proposed project that would achieve the same objective including the "no action alternative". All alternatives must be compared according to international standards and commonly accepted standards as much as possible. The comparison should yield the preferred alternative for implementation. Mitigation options should be specified for each component of the proposed project.

Task 6. Mitigation and management of negative impacts – Identify possible measures to prevent or reduce significant negative impacts to acceptable levels. These will include both environmental and socio-economic mitigation measures. Measures for both construction and operation phase shall be identified. Cost the mitigation measures, equipment and resources required to implement those measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. An Environmental management plan for the proposed project, identifying responsible persons, their duties and commitments shall also be given. In cases where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 7. Development of monitoring plan (see appendix)– Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan for ground water as well as defects in neighbouring structures. Detail of the monitoring program including the physical and biological parameters for monitoring, cost commitment from responsible person to conduct monitoring in the form of a commitment letter, detailed reporting scheduling, costs and methods of undertaking the monitoring program must be provided.

Task 8. Stakeholder consultation – Identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders, authorities Male' City Council, engineers/designers, development managers, staff and members of the general public. The EIA report should include a list of people/groups consulted, their contact details and summary of the major outcomes.

Presentation- The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations f or any references used in interpreting those

data. The environmental assessment report will be organized according to, but not necessarily limited by, the outline given in the Environmental Impact Assessment Regulations, 2012

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within 3 months from the date of this Term of Reference.

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01.10.2015

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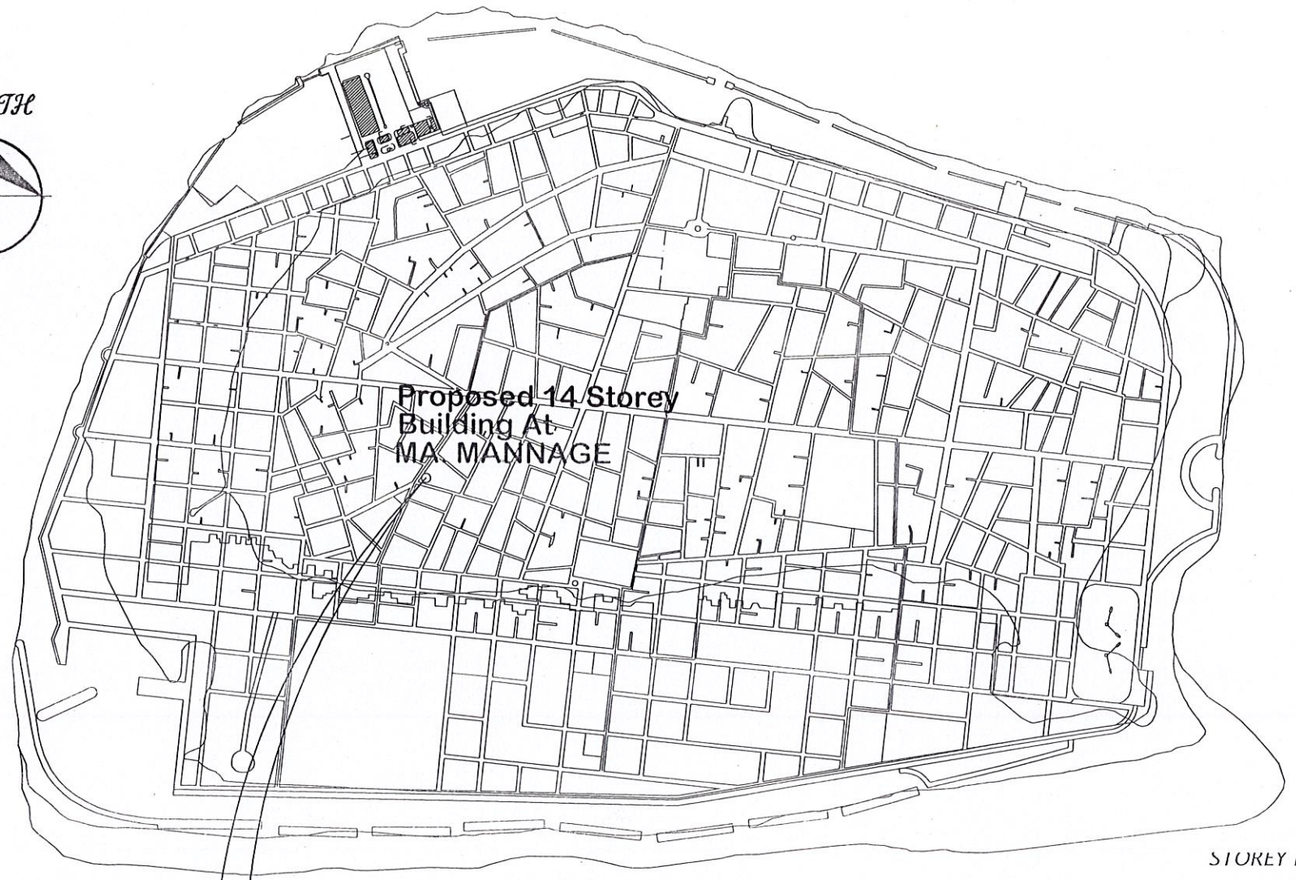
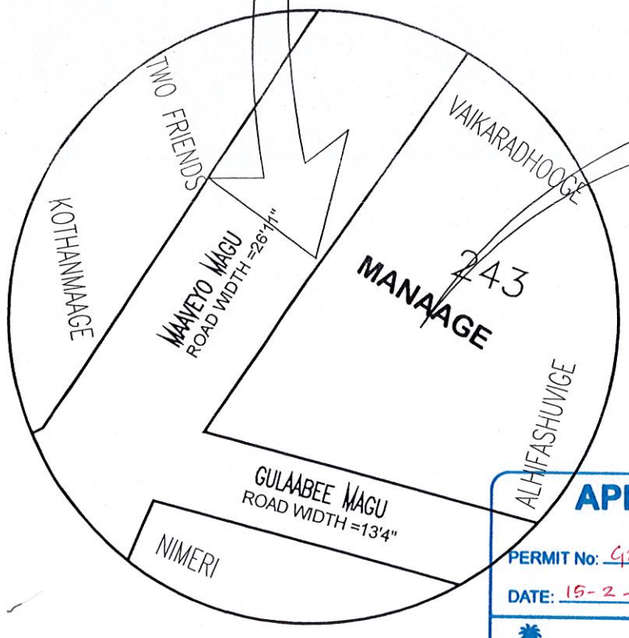


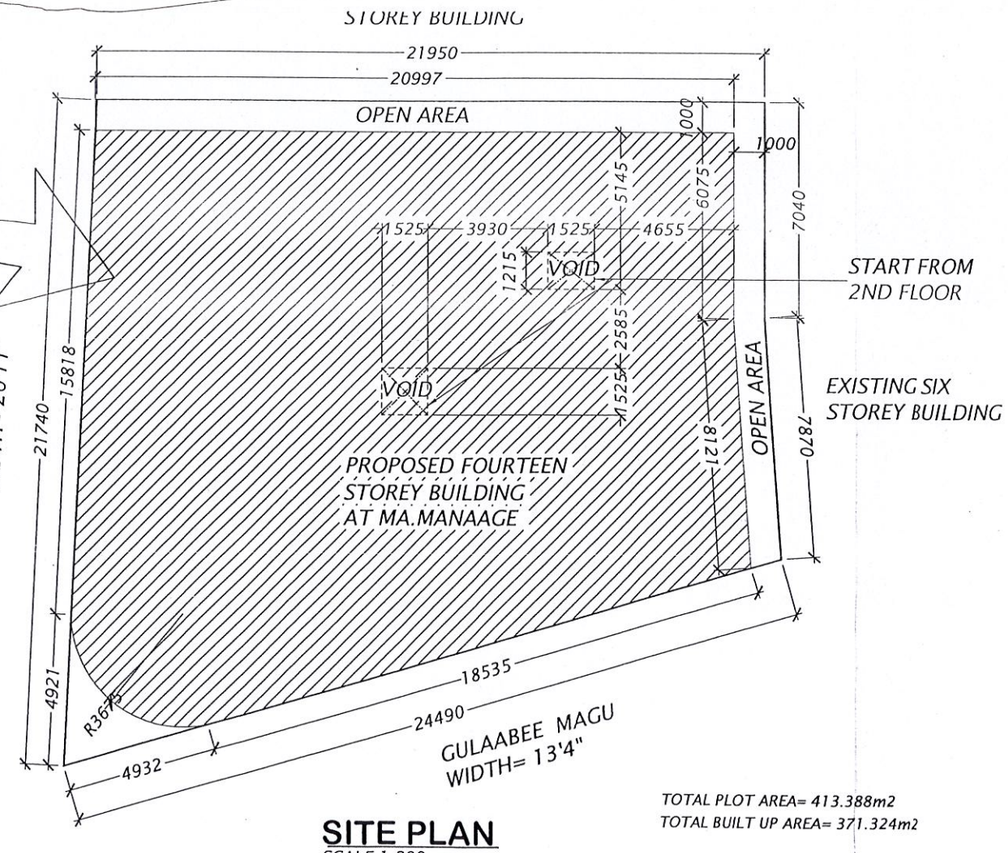
MAP OF MALE



SITE LOCATION PLAN

APPROVED
PERMIT No: G2-A-D/2015/14
DATE: 15-2-2015 SIGNATURE
SECRETARIAT OF THE MALE' CITY COUNCIL
MALE', REPUBLIC OF MALDIVES

STOREY BUILDING



SITE PLAN
SCALE 1:200

TOTAL PLOT AREA= 413.388m2
TOTAL BUILT UP AREA= 371.324m2

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
STRUCTURAL CHECKER A1
Name: Shifaz Ali VALIDITY: 01.2.14 - 31.01.15
Registration No: BPR2014001A1 A1-2014-001-001

Ministry of Housing & Infrastructure
ACCREDITED CHECKER
ARCHITECTURAL CHECKER B1
Name: Ali Shareef VALIDITY: 10.04.14 - 09.04.15
Registration No: BPR2014006B1 B1-2014-006-001

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
SITE PLAN

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

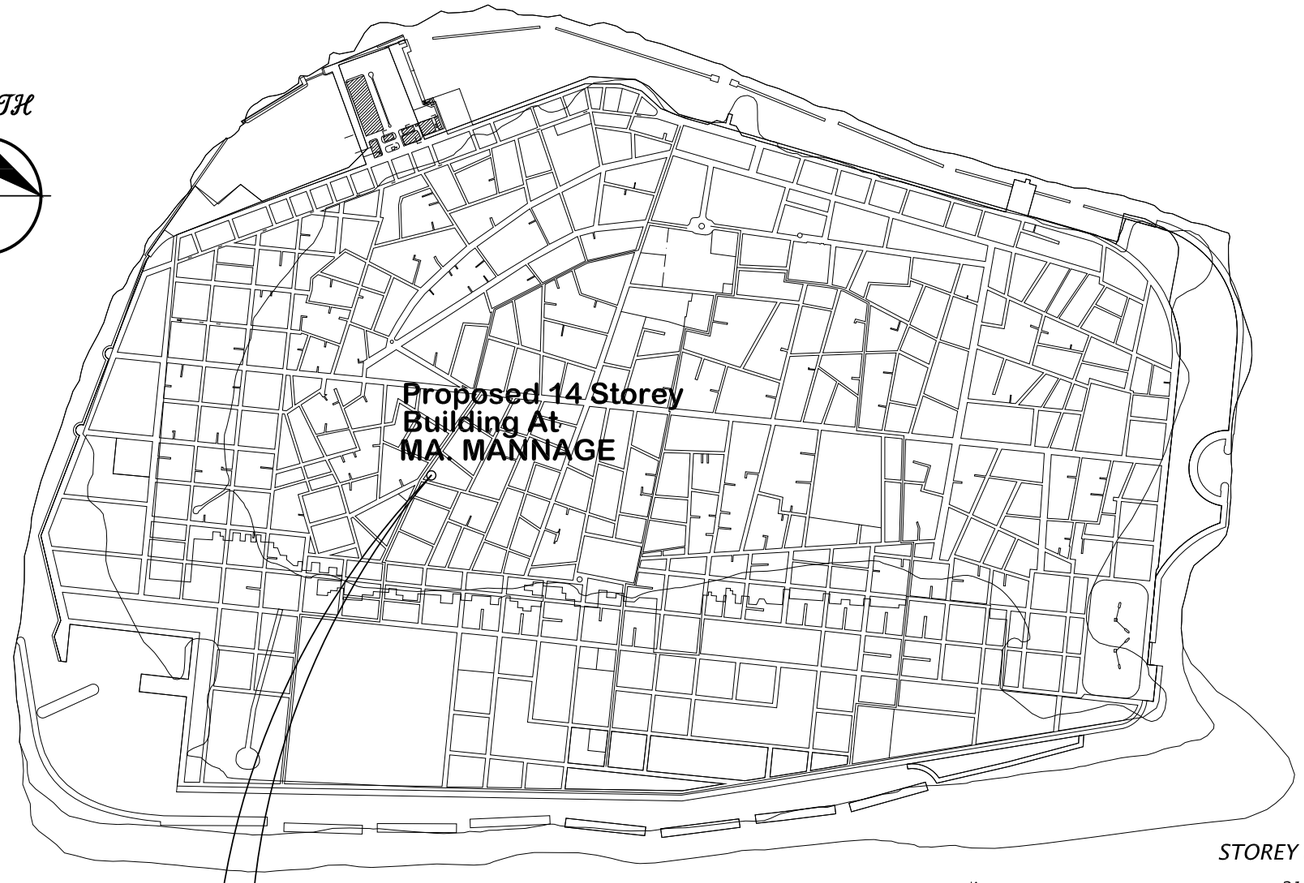
TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
02/10, Martin Spike Building, Ahhangefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4659, (960)33 3638, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

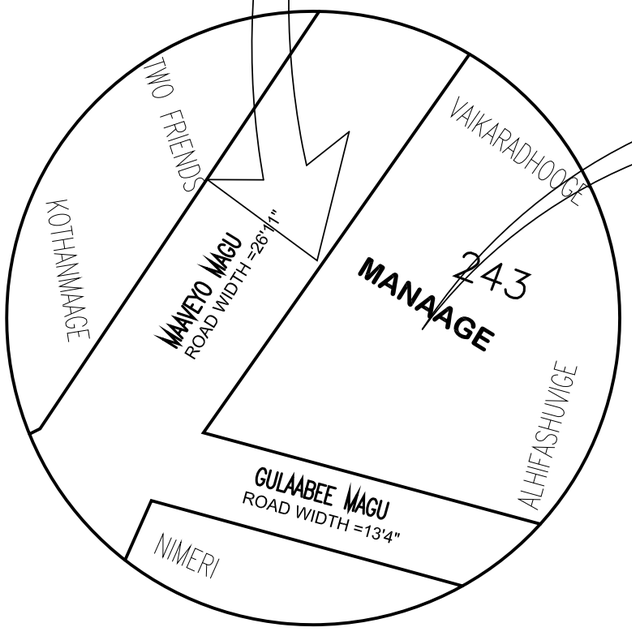
Architect/Designer:	Job No:
Ali Shareef	TD - 1108
Struct. Engineer: Shifaz Ali	Rev. No: -
Drawn: Thomas	File No: -
Surveyed: -	Date: 15-12- 2014
Checked/Approved: -	Scale: 1:200

Dwg. No:
MNG -A - SPL00 - 00

NORTH

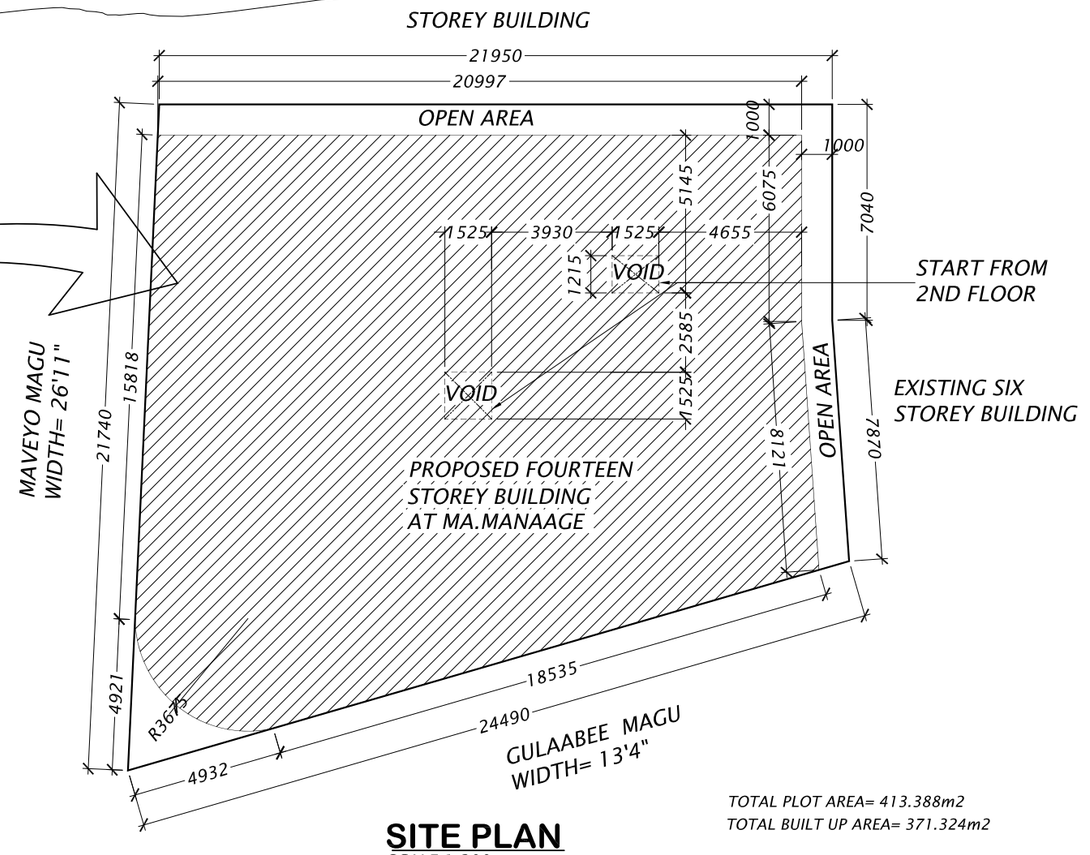


MAP OF MALE



SITE LOCATION PLAN

STOREY BUILDING



TOTAL PLOT AREA= 413.388m2
TOTAL BUILT UP AREA= 371.324m2

SITE PLAN

SCALE 1:200

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY
RESIDENTIAL & COMMERCIAL
BUILDING AT- MA.MANAAGE

Dwg. Title :
SITE PLAN

Client:
RAINBOW CONSTRUCTION

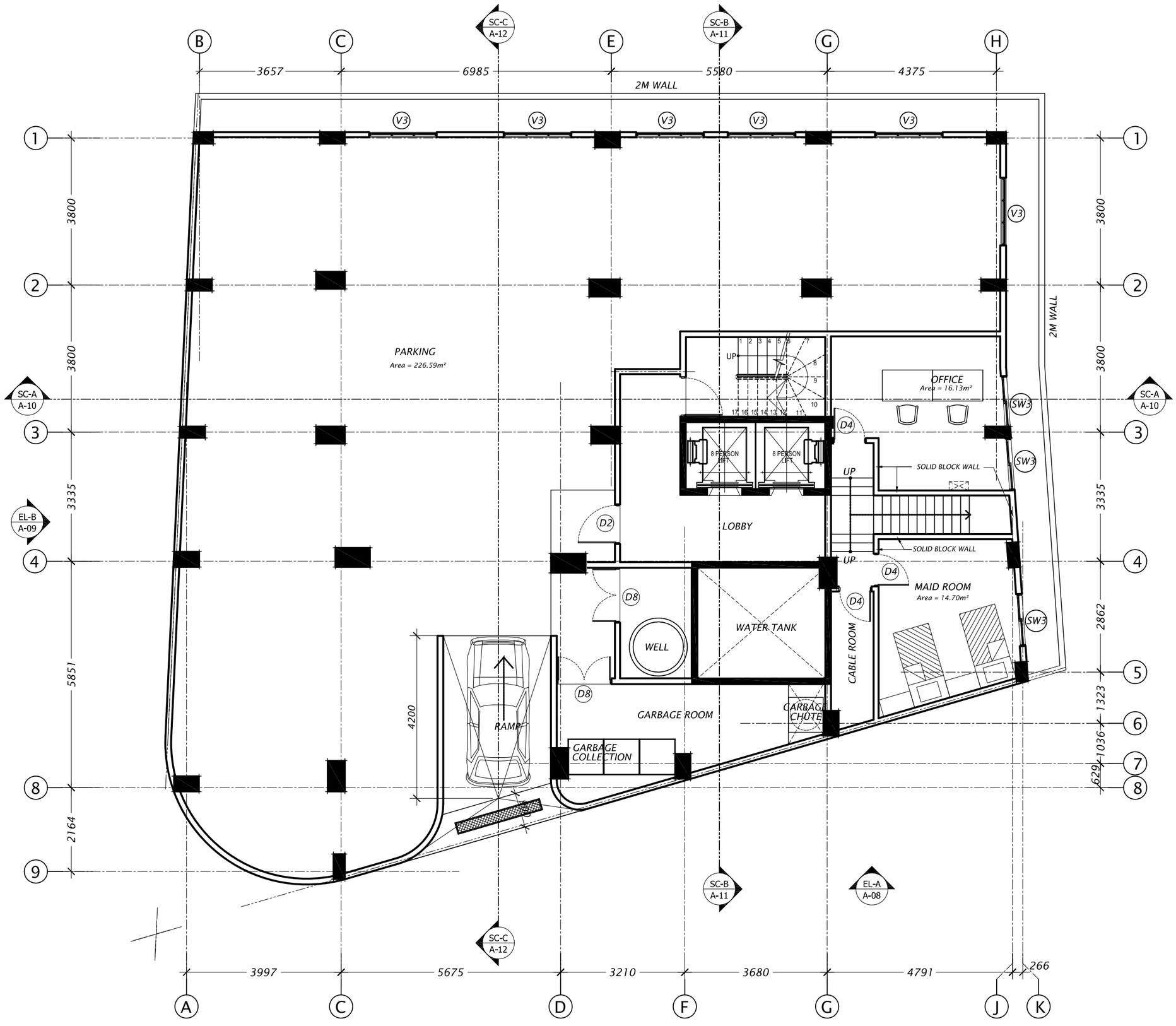
Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
02/10, Marlin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer :	Job No:
Ali Shareef	TD - 1108
Struct. Engineer : Shifaz Ali	Rev. No : -
Drawn : Thomas	File No : -
Surveyed : -	Date: 15-12- 2014
Checked/Approved : -	Scale : 1:200

Dwg. No :
MNG -A - SPL00 - 00



BASEMENT FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
BASEMENT FLOOR PLAN

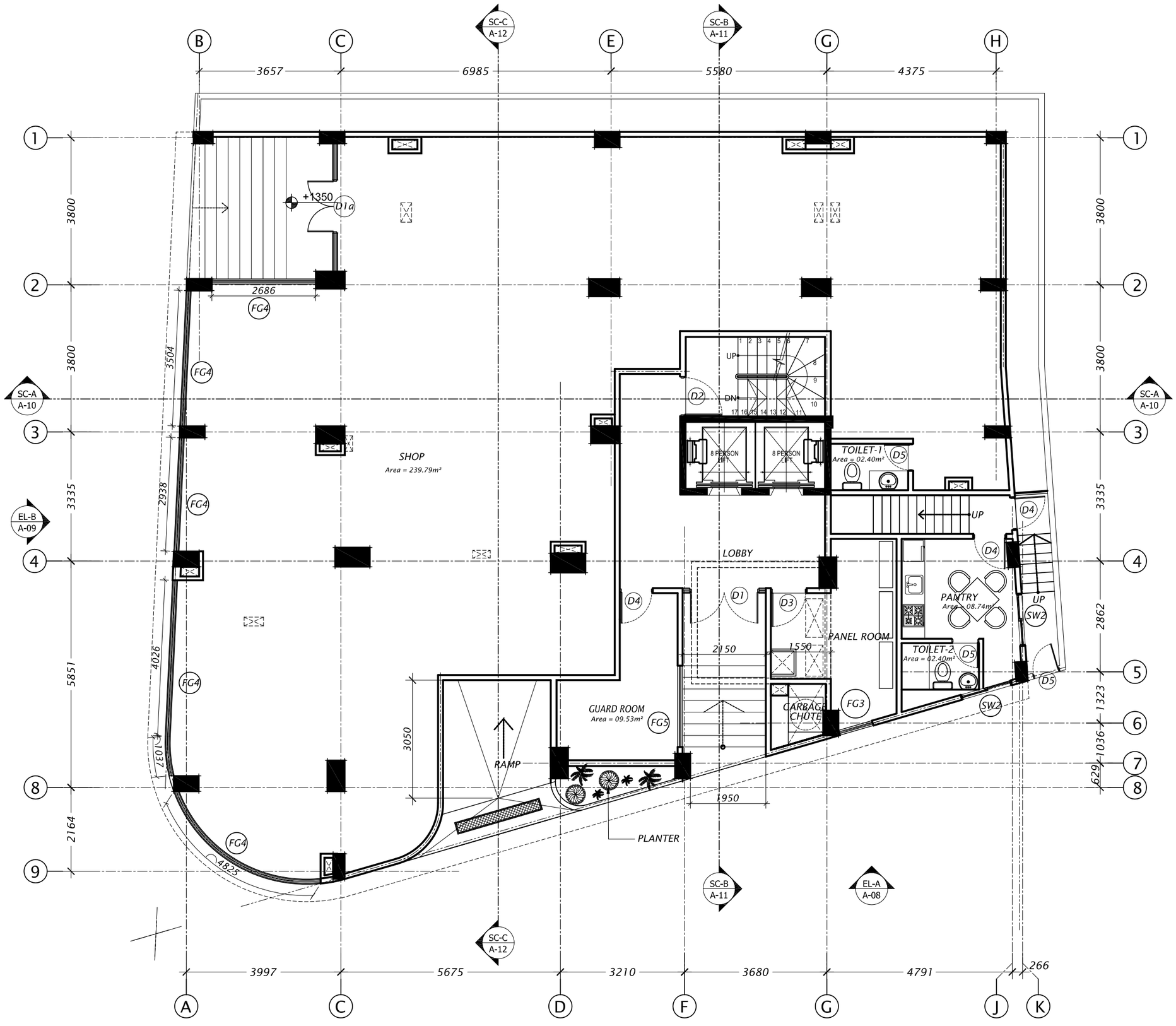
Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd,
02/10, Martin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04,
Rep. of Maldives, Tel: (960)332 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100
Dwg. No : MNG -A - BFPL01 - 01	



GROUND FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
GROUND FLOOR PLAN

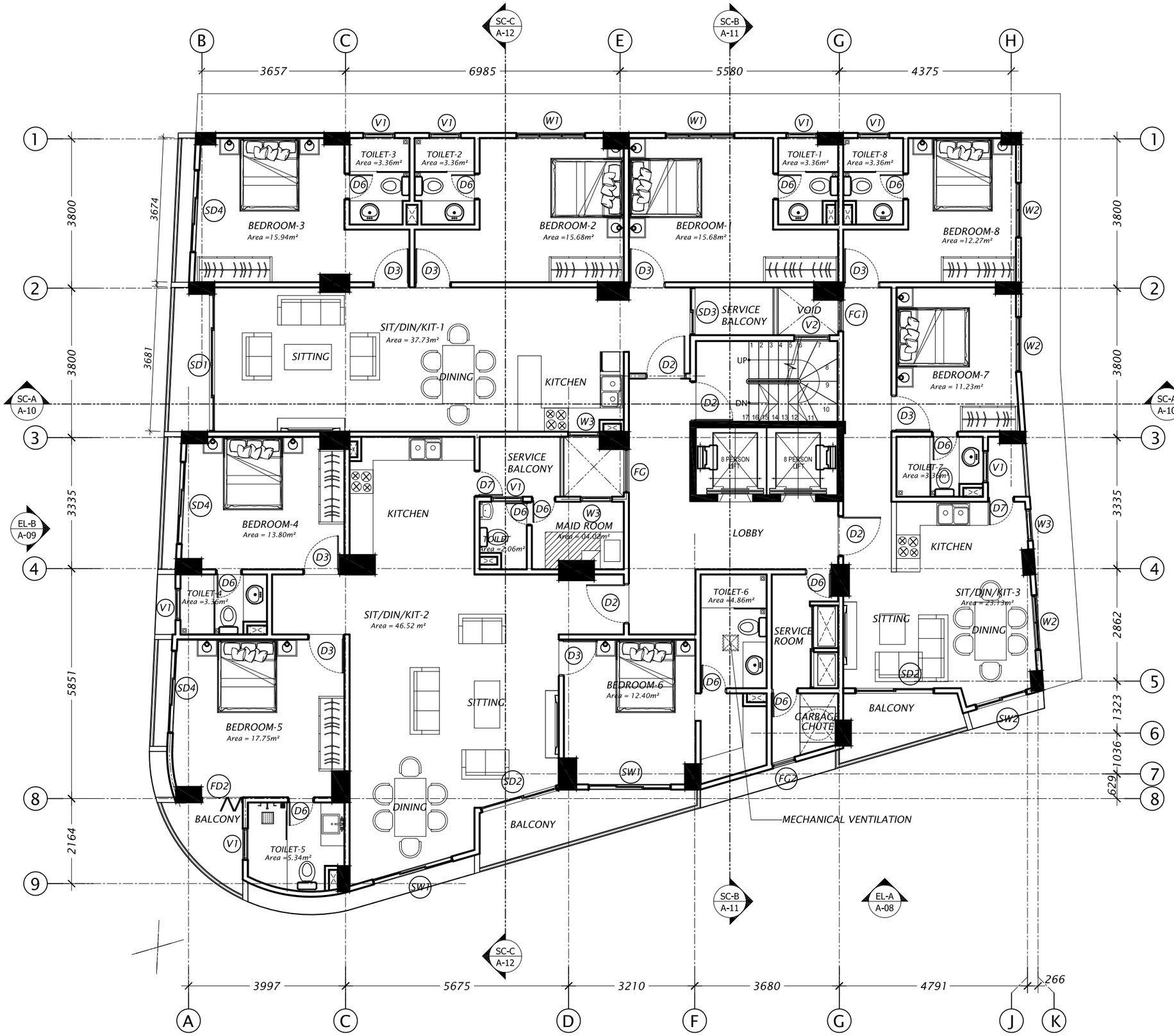
Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd,
02/10, Martin Spike Building, Alikilegolhanu Magu, Galolhu, Male' 20-04,
Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12-2014
Checked/Approved : -	**Scale :** 1:100
Dwg. No : MNG -A - GFPL02 - 02	



1ST FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
1ST FLOOR PLAN

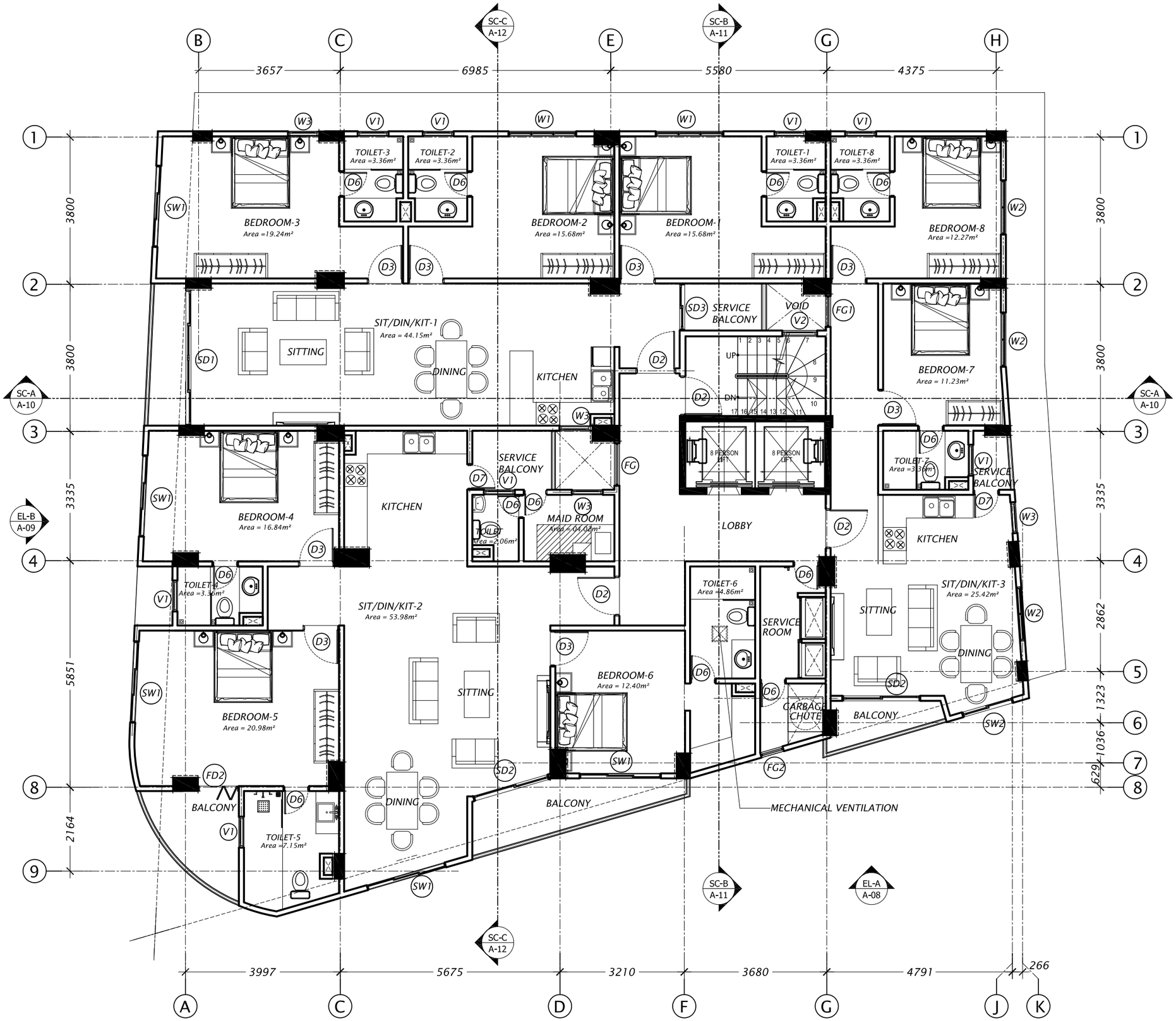
Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
02/10, Marlin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG -A - FPL03 - 03



2nd - 9th FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
2ND - 9TH FLOOR PLAN

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd,
02/10, Martin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG -A - FPL04 - 04

10th - 13th FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
10TH -13TH FLOOR PLAN

Client:
RAINBOW CONSTRUCTION

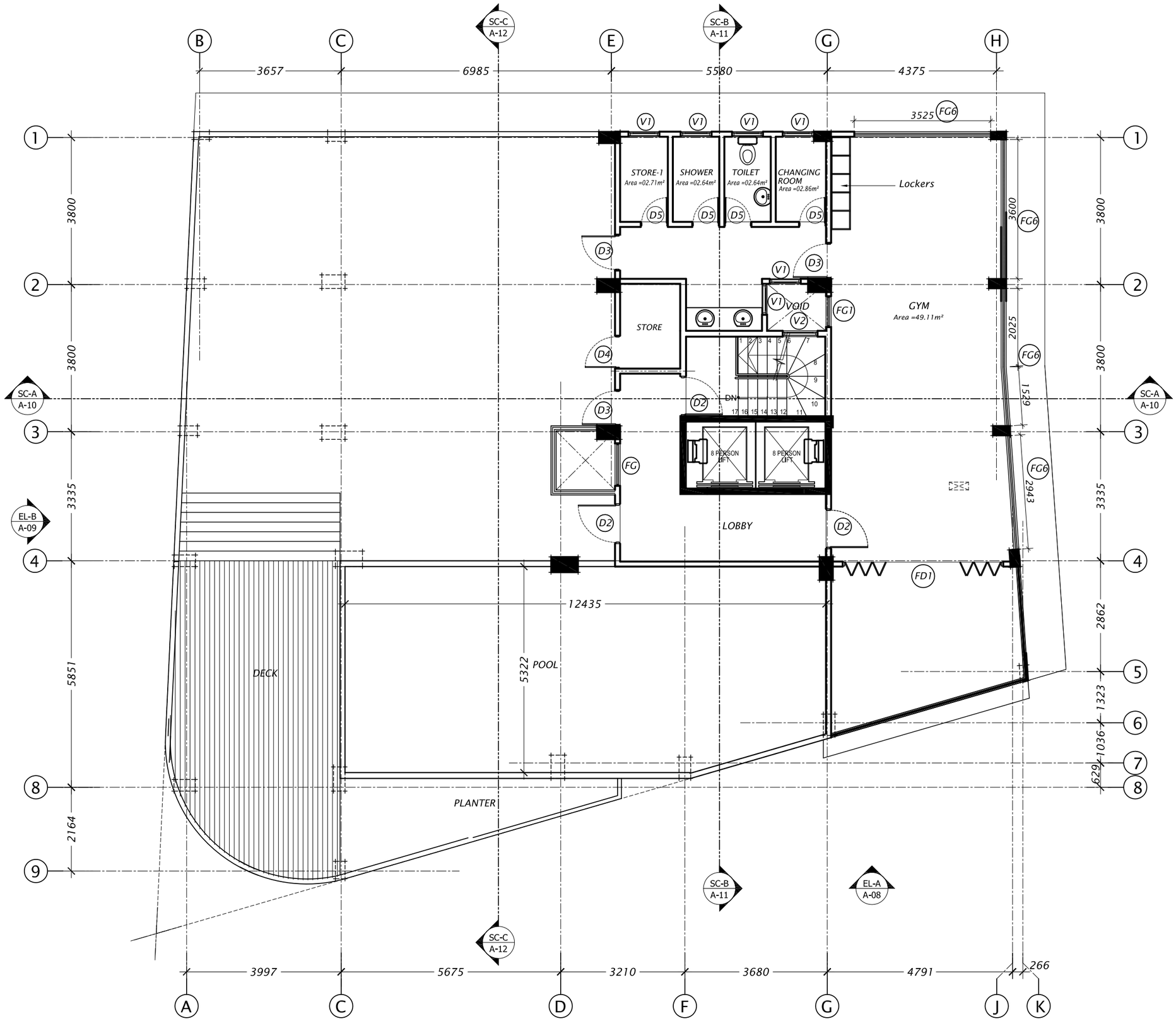
Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd,
02/10, Martin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3659, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	Job No: TD - 1108
Struct. Engineer : Shifaz Ali	Rev. No : -
Drawn : Thomas	File No : -
Surveyed : -	Date: 15-12- 2014
Checked/Approved : -	Scale : 1:100

Dwg. No :
MNG -A - FPL05 - 05



TERRACE FLOOR PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
TERRACE FLOOR PLAN

Client:
RAINBOW CONSTRUCTION

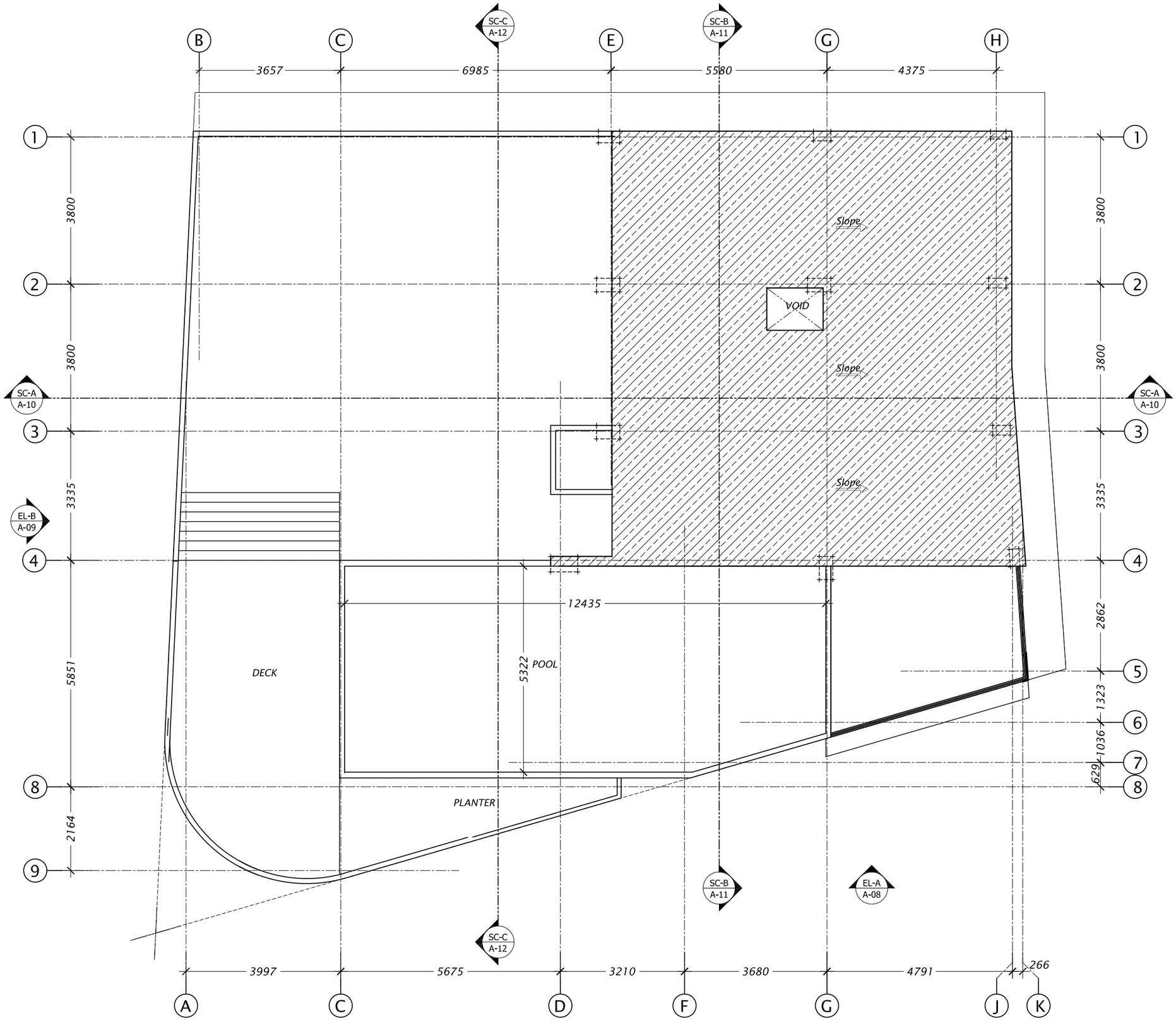
Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
02/10, Martin Spike Building, Alikilegefaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3629, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No :
MNG -A - FPL06 - 06



ROOF PLAN

SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
ROOF PLAN

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd,
02/10, Martin Spike Building, Aiiskilegaifaanu Magu, Galolhu, Male' 20-04, Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No :
MNG -A - FPL07 - 07

ELEVATION - A
SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT MA- MANNAGE

Dwg. Title :
ELEVATION -A

Client:
RAINBOW CONSTRUCTION

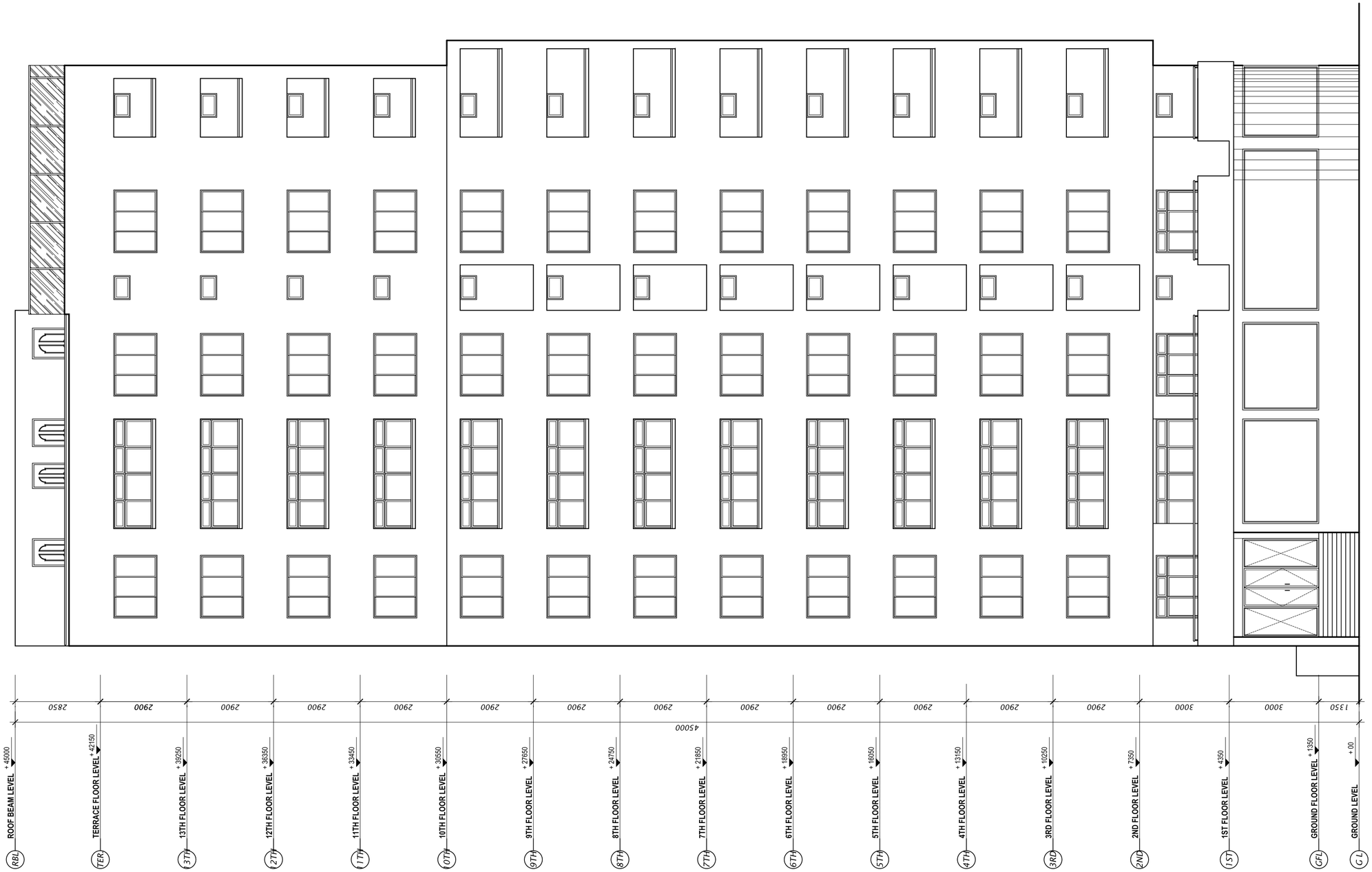
Owner
MR.ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
3rd Floor, H. Mialani, Sosun Magu, Male'.
Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
EMRil: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD-1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG - A ELV01- 08



ELEVATION - B
SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT MA- MANNAGE

Dwg. Title :
ELEVATION -B

Client:
RAINBOW CONSTRUCTION

Owner
MR.ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

TEKTON DESIGN ASSOCIATES Pvt. Ltd.
3rd Floor, H. Mialani, Sosun Magu, Male'.
Rep. of Maldives, Tel: (960)32 4569, (960)33 3639, Fax: (960)32 7374
EMRI: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD-1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG - A ELV02- 09

بسم الله الرحمن الرحيم

މާލެ ސިޓީ ކައުންސިލްގެ އިދާރާ

މާލެ، ދިވެހިރާއްޖެ

• ނަންބަރު: I-LD/2013/5

މާލެ ސިޓީގައި އިމާރާތްކުރުމުގެ ހުއްދަ

• ބްލޮކްގެ ނުވަތަ ތަންގެ ނަން: މއ. މަނާގެ
• ވެރިފަރާތް: އަލީ ފާއިޒް، މުޙައްމަދު ފާއިޒް، އަބްދުﷲ ފާއިޒް، އާމިނަތު ފާއިޒް، މަރްޔަމް ފާއިޒް، ފާތިމަތު ފާއިޒް، އާއިޝަތު ފާއިޒް، ސަމީރާ މުޙައްމަދު

• އިމާރާތުގެ އުސްމިން: 45.000 މީޓަރު
• ފަންގިފިލާގެ އަދަދު: 16 (ސޯޅަ)
• ފަންގިފިލާގެ ބާވަތް: ކޮންކްރީޓް
• ސްޓްރަކްޗަރގެ ބާވަތް: ކޮންކްރީޓް

މިއީ، 15 ޖަނަވަރީ 2012 ގައި މާލެ ސިޓީ ކައުންސިލްގެ އިދާރާއިން ދޫކޮށްފައިވާ I-2012/14 ނަންބަރު މާލޭގައި އިމާރާތްކުރުމުގެ ހުއްދައިގެ މައްޗަށް ބިނާކޮށް ދޫކޮށްފައިވާ ހުއްދައެކެވެ. މި ހުއްދައިގެ ދަށުން އިމާރާތްކުރުމުގައި، މަސައްކަތްކުރާ މީހުންގެ ސަލާމަތާއި ރައްކާތެރިކަމާއި ބެހޭގޮތުން ޤަވާޢިދާއި ޚިލާފުވެގެން ދިމާވާ ކަމެއްގައި، އިންޝުއަރެންސް ތަންފީޛުކުރުމާއި، މަސައްކަތާއި މުޅި މަސްއޫލިއްޔަތު ހުރީ މި ފަރާތުގެ މައްޗަށެވެ. ހުއްދަ ދޫކުރެވުނު ތާރީޚުން ފެށިގެން އެއް އަހަރު ދުވަހުގެ ތެރޭގައި މަސައްކަތް ފަށައި، މާލެ ސިޓީ ކައުންސިލުން ލާޒިމްކުރާ ގޮތުގެ މަތިން މަސައްކަތްކުރަން ޖެހޭނެއެވެ. އަދި އިމާރާތްކުރަން ފަށާއިރު ކައުންސިލަށް އަންގަން ޖެހޭނެއެވެ.

9 ރަބީޢުލްއައްވަލް 1434

21 ޖަނަވަރީ 2013

އަބްދުލްމުޙްސިން ޙަސަން

ޕްލޭން ޑިރެކްޓަރ

• ނޯޓް: މި ހުއްދަ ދޫކުރެވުނު ޝަރުޠުތަކާ ޚިލާފުވެއްޖެނަމަ، މި ހުއްދަ ބާޠިލްވާނެއެވެ. އަދި 21 ޖަނަވަރީ 2013 އިން ފެށިގެން 1 (އެކެއް) އަހަރު ދުވަހުގެ ތެރޭގައި އިމާރާތްކުރަން ނުފަށައިފިނަމަ މި ހުއްދަ ބާޠިލްވާނެއެވެ.

މާލެ ސިޓީ ކައުންސިލްގެ އިދާރާ
މާލެ،
ދިވެހިރާއްޖެ

• ނަންބަރު: G2-A-D/2015/14

އިމާރާތަށް ބޭނުންކުރުމުގެ ހުއްދަ

• އަތޮޅާއި ރަށުގެ ނަން: ކ. މާލެ
• ގޯތީގެ ނަމާއި، ބްލޮކް ނަންބަރު: މާފަންނުގެ، 243
• އިމާރާތުގެ މަޤްޞަދު ބާވަތް: ގުދަނާއި، އޮފީސް، ފިހާރަ، ކެފޭ، ސްޓޯރޭޖާއި ދިރިއުޅުން.
• އިމާރާތުގެ އުސްމިން: 45 މީޓަރު
• ފަންގިފިލާގެ އަދަދު: 16 (ސޯޅަ) ފަންގިފިލާ
• އިމާރާތުގެ ސްޓްރަކްޗަރގެ ބާވަތް: ކޮންކްރީޓް
• އިމާރާތުގެ ފަންގިފިލާގެ ބާވަތް: ކޮންކްރީޓް
• ކުރިން ދޫކޮށްފައިވާ ހުއްދަ: • ނަންބަރު: G2-A-A/2015/71 • ތާރީޚު: 15 ޑިސެންބަރު 2015
• އާކިޓެކްޓް: އަލީ ޝަކީރު • ހުއްދަ ނަންބަރު: BDR2014096A
• ސިވިލް އިންޖިނިއަރު: ޝަރީފް އަލީ • ހުއްދަ ނަންބަރު: BDR2014027E
• ބިމުގެ ވެރިފަރާތް/ފަރާތްތައް: އަލީ ފާއިޒް، މުޙައްމަދު ފާއިޒް، ޢަބްދުﷲ ފާއިޒް، އާމިނަތު ފާއިޒް، ޙަސަން ފާއިޒް، ފާތިމަތު ފާއިޒް، އާއިޝަތު ފާއިޒް، ޝަކީރާ މުޙައްމަދު
• ހުއްދަ ދިނުމުގެ ޝަރުޠު: މި ހުއްދައިގެ ދަށުން ބޭނުންކުރެވޭނީ އިމާރާތް ހެދުމުގެ ޕްލޭނުގައި ކަނޑައަޅާފައިވާ ބޭނުމަކަށް، އެކުލަވާލާފައިވާ ގަވާއިދުތަކާއި، ޤާނޫނުތަކާއި ޚިލާފުނުވާ ގޮތުގެ މަތިން، ސިޓީ ކައުންސިލުން އެކަށައަޅާފައިވާ އުސޫލުތަކާއި، ޝަރުޠުތަކާ އެއްގޮތަށް އާބާދީ ރޭވުމަށް ރާއްޖޭގެ ނަންބަރު A-97/39 އިޢުލާނާއި، ދިވެހިރާއްޖޭގެ ޤާނޫނީ އަސާސީގައި ބަޔާންކޮށްފައިވާ ގޮތުގެ މަތިން، ޤާނޫނާއި ގަވާއިދާ ޚިލާފުނުވާ ގޮތަށް ބޭނުންކުރުމަށް އެ ހުއްދަ ދޫކުރެވޭ އިމާރާތުގެ ބޭނުން ބަދަލުކޮށްގެން ނުވާނެއެވެ.
• ހުއްދައިގެ މުއްދަތު ހަމަވާ ތާރީޚު: 14 ޑިސެންބަރު 2016

މަތީގައި ބަޔާންކޮށްފައިވާ ގޯތީގެ މަތިން، މަތީގައި މަޢުލޫމާތު ދީފައިވާ އިމާރާތަށް ބޭނުންކުރުމުގެ ހުއްދަ ދީފީމެވެ.
25 ރަބީޢުލްއައްވަލް 1436
15 ޑިސެންބަރު 2015

އިސްމާޢީލް ޙަމީދު
ސިކުރެޓަރީ ޖެނެރަލް

• ނޯޓް: މި ހުއްދައަކީ އެއްވެސް އިމާރާތެއް ބިނާކުރުމުގެ ހުއްދައެއް ނޫނެވެ.

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
FEN Building 5th Floor, Machangoalhi, Ameeneemagu, Male', Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

بسم الله الرحمن الرحيم

MWSC

WATER QUALITY TEST REPORT

Test Report No: 300334/2015/03

Customer Informations : ***Rainbow Construction Pvt Ltd***
G. Maarana,
Alikilegefaanu Magu
Male'
Rep.of Maldives

Date: 06/09/2015

Sample Description / Location~	**Ma. Manaage Ground Water**	**TEST METHOD**	**UNIT**
Sample Type~	Ground water		
Sampled Date~	1/9/2015		
Sample Received Date	2/9/2015		
Test Requisition Form No.	900161290		
Sample No.	818632		
Date of Analysis	3/9/2015-4/9/2015		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Pale yellow with particles	Visual	-
Conductivity	1837	Method 2510 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	µS/cm
Nitrate	37.2	Method 8171 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
pH	7.42	Method 4500-H+ B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	-
Nitrogen Ammonia	0.15	Method 8038 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Sulphide	<5 (LoQ 5µg/L)	Method 8131 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	µg/L
Salinity	0.93	Method 2520 B. (adapted from Standard methods for the examintation of water and waste water, 21st edition)	‰
Phosphate	0.12	Method 8048 (Adapted from HACH DR5000 Spectrophotometer procedure Manual)	mg/L
Dissolved Oxygen (DO)	6.13	Standard Methods 19th edition APHA	mg/L
Temperature	22.5	Electrometry	°C
Total Dissolved Solids (TDS)	919	Electrometry	mg/L
Turbidity	1.88	HACH Nephelometric Method (adapted from HACH 2100N Turbidimeter User Manual)	NTU
Coliform, Faecal	>2420	Colilert®-18/Quanti-Tray®	CFU/100mL

Keys:

UNITS: µS/cm: Micro Siemens per centimeter, **mg/L:** Milligrams per litre, **NTU:** Nephelometric Turbidity Unit, **‰:** Parts per thousand, **°C:** Degree Celcius, **CFU:** Colony Forming Unit, **µg/L:** Micrograms per litre

LOQ: Limit of Quantification

Checked by:	**Approved by:**
Afnan Farooq Laboratory Executive	Mohamed Eyman Senior Technical Officer

Notes:

Sampling Authority: Sampling was not done by MWSC Laboratory

This test report is ONLY FOR THE SAMPLES TESTED.

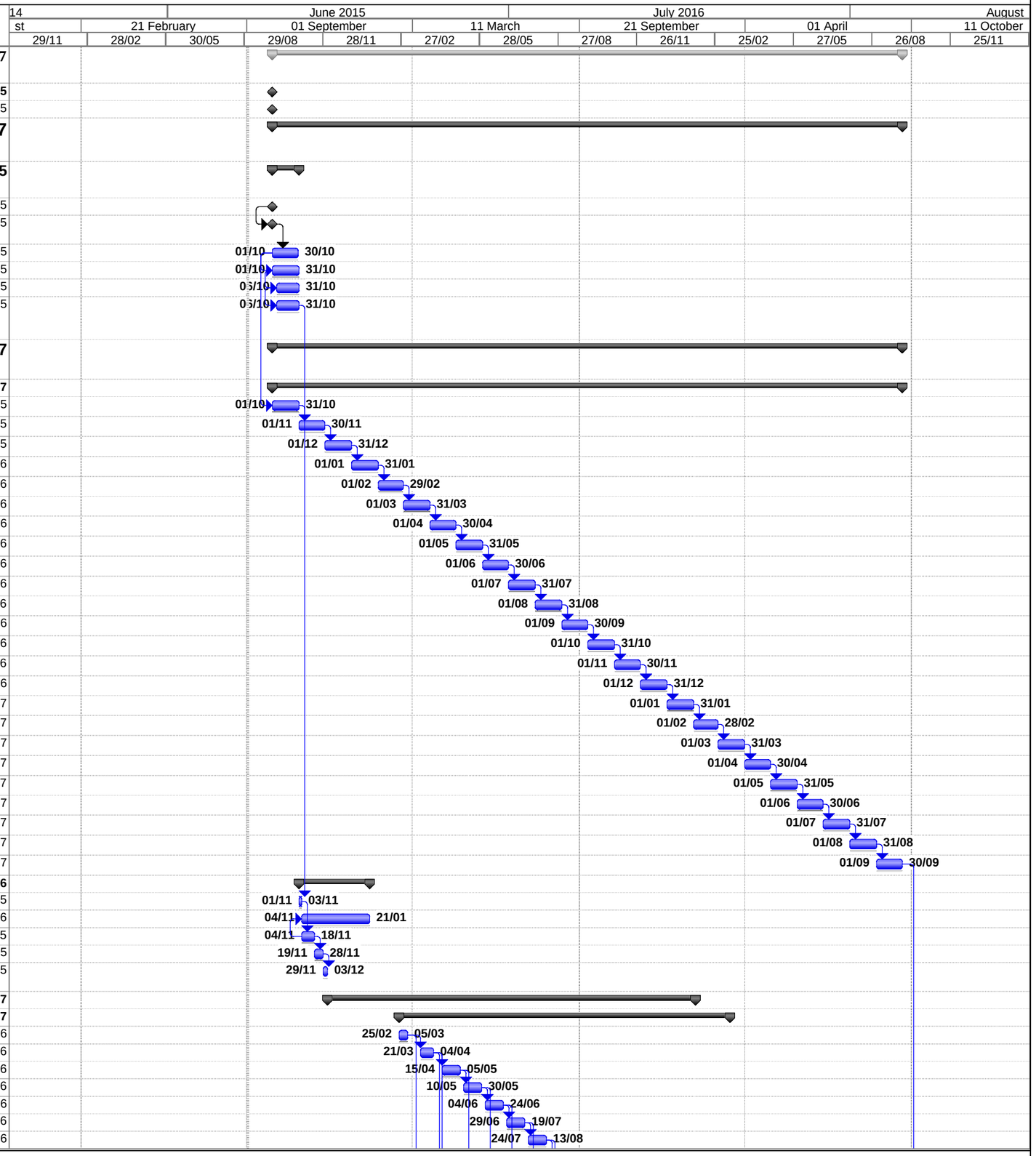
~ Information Supplied by the customer

**********END OF THE REPORT**********

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
0	**SCHEDULE OF MANAAGE BUILDING (CONTRACT+ EXECUTION)**	**731 days**	**Thu 01/10/15**	**Sat 30/09/17**
1	**Contractual Activities**	**0 days**	**Thu 01/10/15**	**Thu 01/10/15**
2	Signing of the contract - (incl. drawing design)	0 days	Thu 01/10/15	Thu 01/10/15
3	**PROGRAM FOR 14 STOREY BLDG AT MANAAGE**	**731 days**	**Thu 01/10/15**	**Sat 30/09/17**
4	**Pre-Construction activities / Mobilization/ Temporary works**	**31 days**	**Thu 01/10/15**	**Sat 31/10/15**
5	Receipt of Commencement Notice	0 days	Thu 01/10/15	Thu 01/10/15
6	Possession of site - free land after completion of Demolition incl disconnection of existing services.	0 days	Thu 01/10/15	Thu 01/10/15
7	Mobilization period for machinery & Manpower	30 days	Thu 01/10/15	Fri 30/10/15
8	All Temporary works incl fencing	31 days	Thu 01/10/15	Sat 31/10/15
9	Obtaining Temporary services connections	26 days	Tue 06/10/15	Sat 31/10/15
10	Obtaining Dewatering permission incl all process of installation of MWSC chamber at site (or) completion of piping works to the Sea	26 days	Tue 06/10/15	Sat 31/10/15
11	**Main Construction activities of MANAAGE BUILDING**	**731 days**	**Thu 01/10/15**	**Sat 30/09/17**
12	**Preliminaries**	**731 days**	**Thu 01/10/15**	**Sat 30/09/17**
13	Month 1	31 days	Thu 01/10/15	Sat 31/10/15
14	Month 2	30 days	Sun 01/11/15	Mon 30/11/15
15	Month 3	31 days	Tue 01/12/15	Thu 31/12/15
16	Month 4	31 days	Fri 01/01/16	Sun 31/01/16
17	Month 5	29 days	Mon 01/02/16	Mon 29/02/16
18	Month 6	31 days	Tue 01/03/16	Thu 31/03/16
19	Month 7	30 days	Fri 01/04/16	Sat 30/04/16
20	Month 8	31 days	Sun 01/05/16	Tue 31/05/16
21	Month 9	30 days	Wed 01/06/16	Thu 30/06/16
22	Month 10	31 days	Fri 01/07/16	Sun 31/07/16
23	Month 11	31 days	Mon 01/08/16	Wed 31/08/16
24	Month 12	30 days	Thu 01/09/16	Fri 30/09/16
25	Month 13	31 days	Sat 01/10/16	Mon 31/10/16
26	Month 14	30 days	Tue 01/11/16	Wed 30/11/16
27	Month 15	31 days	Thu 01/12/16	Sat 31/12/16
28	Month 16	31 days	Sun 01/01/17	Tue 31/01/17
29	Month 17	28 days	Wed 01/02/17	Tue 28/02/17
30	Month 18	31 days	Wed 01/03/17	Fri 31/03/17
31	Month 19	30 days	Sat 01/04/17	Sun 30/04/17
32	Month 20	31 days	Mon 01/05/17	Wed 31/05/17
33	Month 21	30 days	Thu 01/06/17	Fri 30/06/17
34	Month 22	31 days	Sat 01/07/17	Mon 31/07/17
35	Month 23	31 days	Tue 01/08/17	Thu 31/08/17
36	Month 24	30 days	Fri 01/09/17	Sat 30/09/17
37	**Ground works**	**82 days**	**Sun 01/11/15**	**Thu 21/01/16**
38	Setting out & Marking	3 days	Sun 01/11/15	Tue 03/11/15
39	Dewatering	79 days	Wed 04/11/15	Thu 21/01/16
40	Shoring & Protection of adjacent foundations	15 days	Wed 04/11/15	Wed 18/11/15
41	Raft Excavation	10 days	Thu 19/11/15	Sat 28/11/15
42	levelling & compaction of excavated area's to receive lean concrete	5 days	Sun 29/11/15	Thu 03/12/15
43	**Concrete works**	**427 days**	**Fri 04/12/15**	**Thu 02/02/17**
135	**Masonry works**	**384 days**	**Thu 25/02/16**	**Tue 14/03/17**
136	Basement Floor	10 days	Thu 25/02/16	Sat 05/03/16
137	Ground floor	15 days	Mon 21/03/16	Mon 04/04/16
138	1st floor	21 days	Fri 15/04/16	Thu 05/05/16
139	2nd floor	21 days	Tue 10/05/16	Mon 30/05/16
140	3rd floor	21 days	Sat 04/06/16	Fri 24/06/16
141	4th floor	21 days	Wed 29/06/16	Tue 19/07/16
142	5th floor	21 days	Sun 24/07/16	Sat 13/08/16



RAINBOW CONSTRUCTION PVT,LTD.

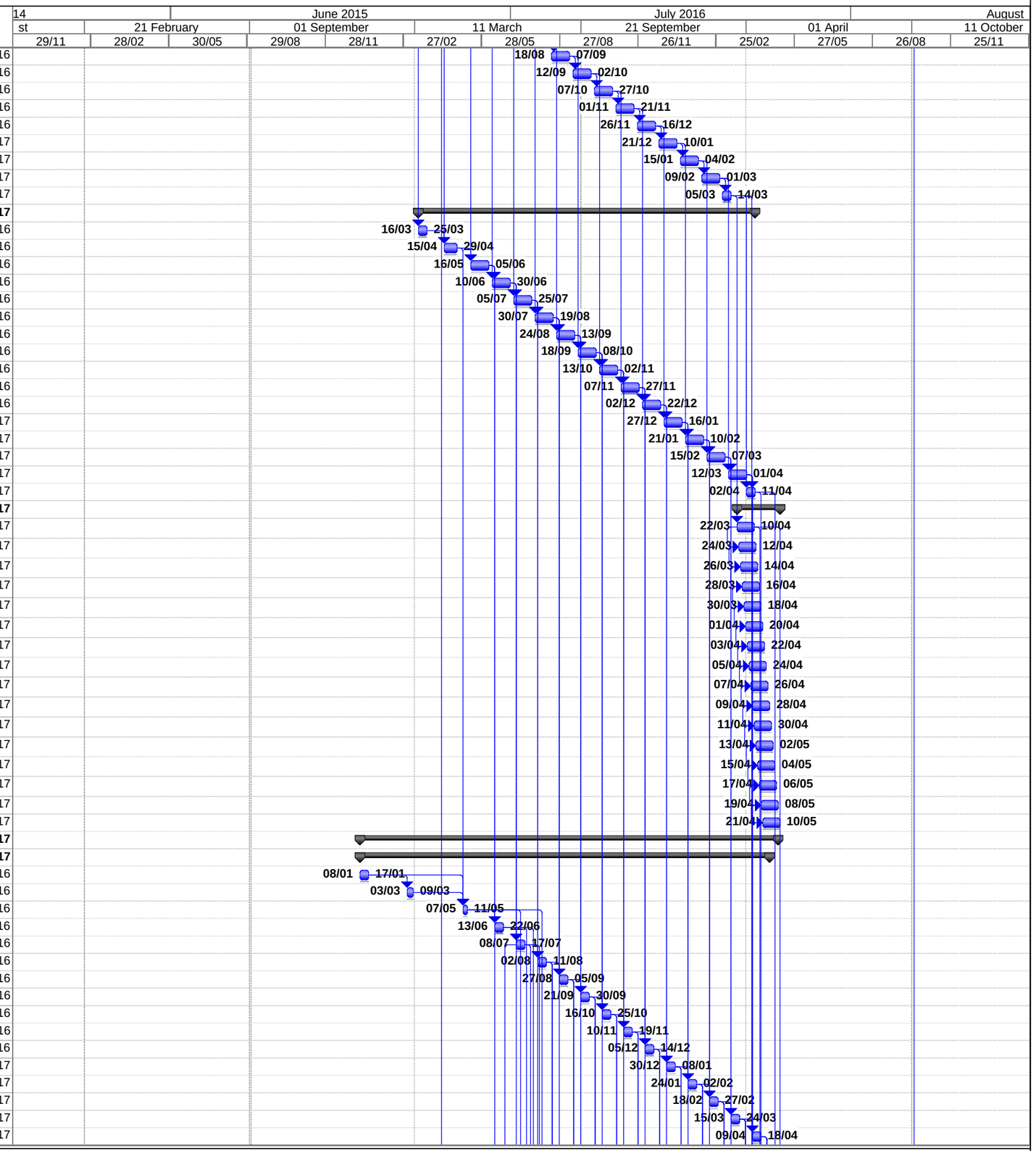
Task — Summary — Rolled Up Milestone ◇ — Split — Project Summary — Progress

Milestone ◆ — Rolled Up Task — Rolled Up Progress — External Tasks — Group By Summary — Deadline ⇩

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
143	6th floor	21 days	Thu 18/08/16	Wed 07/09/16
144	7th floor	21 days	Mon 12/09/16	Sun 02/10/16
145	8th floor	21 days	Fri 07/10/16	Thu 27/10/16
146	9th floor	21 days	Tue 01/11/16	Mon 21/11/16
147	10th floor	21 days	Sat 26/11/16	Fri 16/12/16
148	11th floor	21 days	Wed 21/12/16	Tue 10/01/17
149	12th floor	21 days	Sun 15/01/17	Sat 04/02/17
150	13th floor	21 days	Thu 09/02/17	Wed 01/03/17
151	Terrace floor	10 days	Sun 05/03/17	Tue 14/03/17
152	**Internal Plastering (Incl Plumbing Ducts)**	**392 days**	**Wed 16/03/16**	**Tue 11/04/17**
153	Basement Floor	10 days	Wed 16/03/16	Fri 25/03/16
154	Ground floor	15 days	Fri 15/04/16	Fri 29/04/16
155	1st floor	21 days	Mon 16/05/16	Sun 05/06/16
156	2nd floor	21 days	Fri 10/06/16	Thu 30/06/16
157	3rd floor	21 days	Tue 05/07/16	Mon 25/07/16
158	4th floor	21 days	Sat 30/07/16	Fri 19/08/16
159	5th floor	21 days	Wed 24/08/16	Tue 13/09/16
160	6th floor	21 days	Sun 18/09/16	Sat 08/10/16
161	7th floor	21 days	Thu 13/10/16	Wed 02/11/16
162	8th floor	21 days	Mon 07/11/16	Sun 27/11/16
163	9th floor	21 days	Fri 02/12/16	Thu 22/12/16
164	10th floor	21 days	Tue 27/12/16	Mon 16/01/17
165	11th floor	21 days	Sat 21/01/17	Fri 10/02/17
166	12th floor	21 days	Wed 15/02/17	Tue 07/03/17
167	13th floor	21 days	Sun 12/03/17	Sat 01/04/17
168	Terrace floor	10 days	Sun 02/04/17	Tue 11/04/17
169	**External Plastering**	**50 days**	**Wed 22/03/17**	**Wed 10/05/17**
170	Terrace Floor	20 days	Wed 22/03/17	Mon 10/04/17
171	13th floor	20 days	Fri 24/03/17	Wed 12/04/17
172	12th floor	20 days	Sun 26/03/17	Fri 14/04/17
173	11th floor	20 days	Tue 28/03/17	Sun 16/04/17
174	10th floor	20 days	Thu 30/03/17	Tue 18/04/17
175	9th floor	20 days	Sat 01/04/17	Thu 20/04/17
176	8th floor	20 days	Mon 03/04/17	Sat 22/04/17
177	7th floor	20 days	Wed 05/04/17	Mon 24/04/17
178	6th floor	20 days	Fri 07/04/17	Wed 26/04/17
179	5th floor	20 days	Sun 09/04/17	Fri 28/04/17
180	4th floor	20 days	Tue 11/04/17	Sun 30/04/17
181	3rd floor	20 days	Thu 13/04/17	Tue 02/05/17
182	2nd floor	20 days	Sat 15/04/17	Thu 04/05/17
183	1st floor	20 days	Mon 17/04/17	Sat 06/05/17
184	Ground floor	20 days	Wed 19/04/17	Mon 08/05/17
185	Basement Floor	20 days	Fri 21/04/17	Wed 10/05/17
186	**Plumbing works**	**487 days**	**Fri 08/01/16**	**Mon 08/05/17**
187	**Internal Plumbing**	**477 days**	**Fri 08/01/16**	**Fri 28/04/17**
188	Shop drawings approvals	10 days	Fri 08/01/16	Sun 17/01/16
189	Pipes and Fittings delivered to site	7 days	Thu 03/03/16	Wed 09/03/16
190	Ground floor	5 days	Sat 07/05/16	Wed 11/05/16
191	1st floor	10 days	Mon 13/06/16	Wed 22/06/16
192	2nd floor	10 days	Fri 08/07/16	Sun 17/07/16
193	3rd floor	10 days	Tue 02/08/16	Thu 11/08/16
194	4th floor	10 days	Sat 27/08/16	Mon 05/09/16
195	5th floor	10 days	Wed 21/09/16	Fri 30/09/16
196	6th floor	10 days	Sun 16/10/16	Tue 25/10/16
197	7th floor	10 days	Thu 10/11/16	Sat 19/11/16
198	8th floor	10 days	Mon 05/12/16	Wed 14/12/16
199	9th floor	10 days	Fri 30/12/16	Sun 08/01/17
200	10th floor	10 days	Tue 24/01/17	Thu 02/02/17
201	11th floor	10 days	Sat 18/02/17	Mon 27/02/17
202	12th floor	10 days	Wed 15/03/17	Fri 24/03/17
203	13th floor	10 days	Sun 09/04/17	Tue 18/04/17



RAINBOW CONSTRUCTION PVT,LTD.

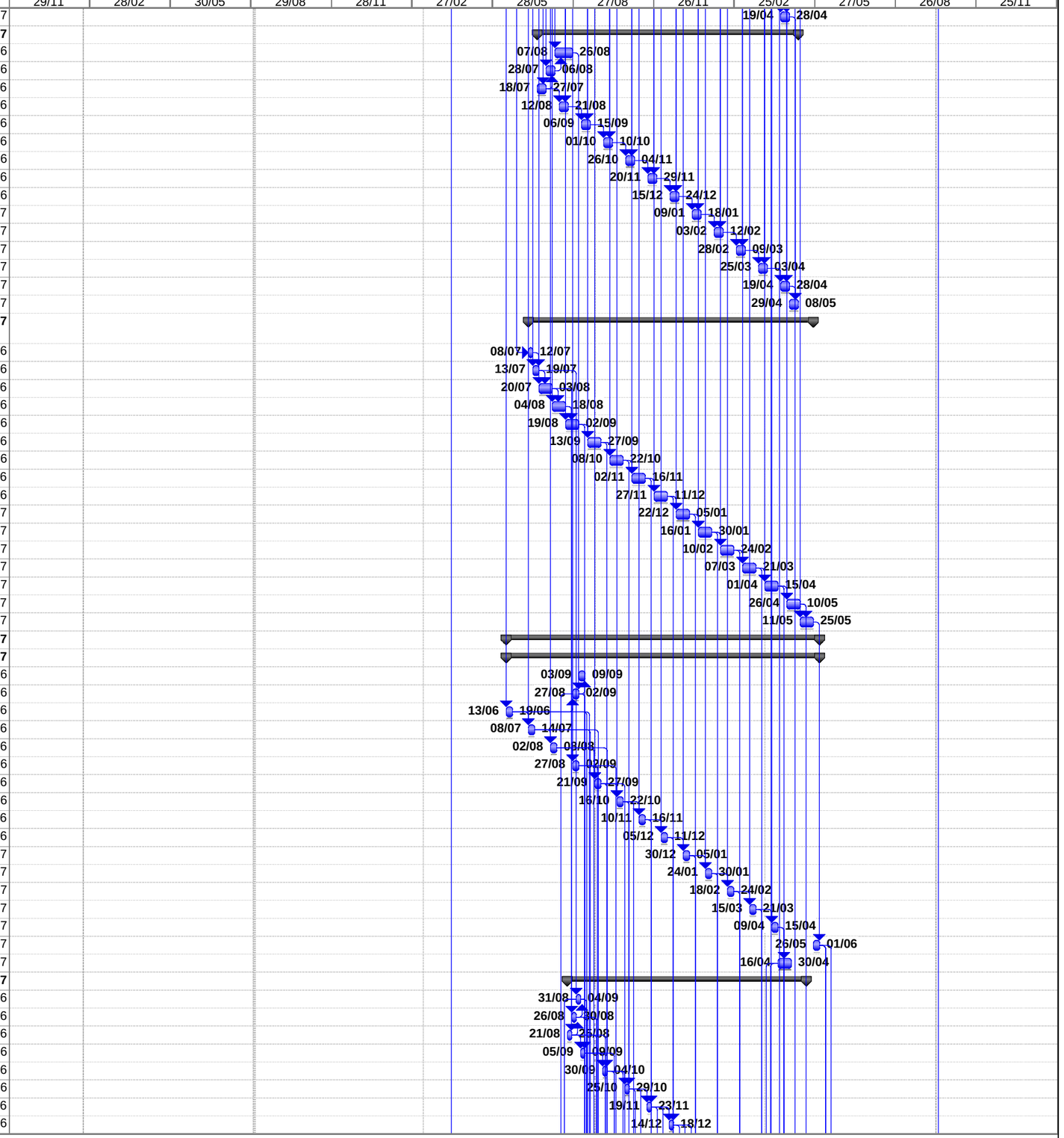
Task | Summary | Rolled Up Milestone ◇ | Split | Project Summary | Progress

Milestone ◆ | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline ⇩

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

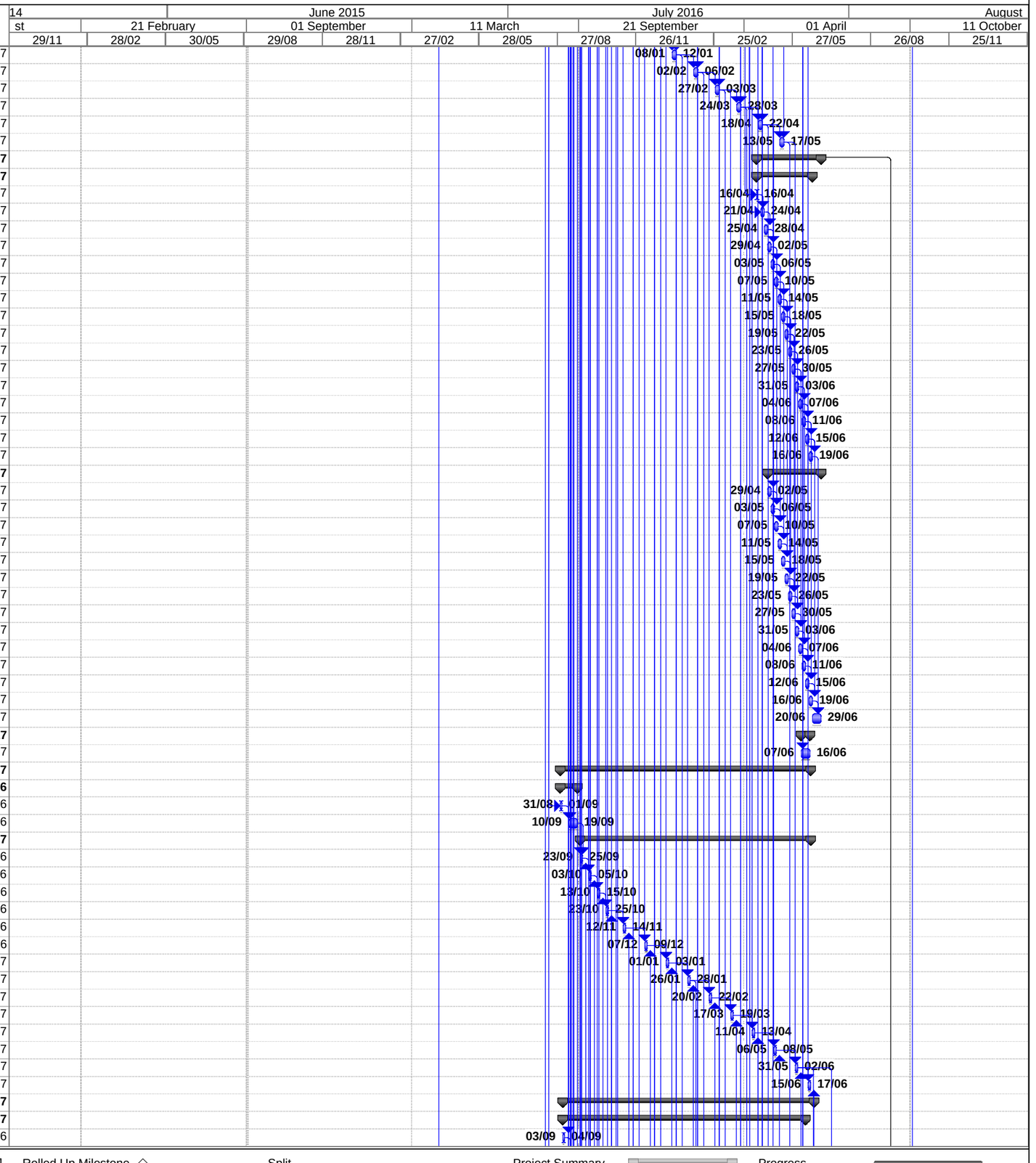
ID	Task Name	Duration	Start	Finish
204	Terrace floor	10 days	Wed 19/04/17	Fri 28/04/17
205	**External Plumbing**	**295 days**	**Mon 18/07/16**	**Mon 08/05/17**
206	Ground floor	20 days	Sun 07/08/16	Fri 26/08/16
207	1st floor	10 days	Thu 28/07/16	Sat 06/08/16
208	2nd floor	10 days	Mon 18/07/16	Wed 27/07/16
209	3rd floor	10 days	Fri 12/08/16	Sun 21/08/16
210	4th floor	10 days	Tue 06/09/16	Thu 15/09/16
211	5th floor	10 days	Sat 01/10/16	Mon 10/10/16
212	6th floor	10 days	Wed 26/10/16	Fri 04/11/16
213	7th floor	10 days	Sun 20/11/16	Tue 29/11/16
214	8th floor	10 days	Thu 15/12/16	Sat 24/12/16
215	9th floor	10 days	Mon 09/01/17	Wed 18/01/17
216	10th floor	10 days	Fri 03/02/17	Sun 12/02/17
217	11th floor	10 days	Tue 28/02/17	Thu 09/03/17
218	12th floor	10 days	Sat 25/03/17	Mon 03/04/17
219	13th floor	10 days	Wed 19/04/17	Fri 28/04/17
220	Terrace floor	10 days	Sat 29/04/17	Mon 08/05/17
221	**Waterproofing works- wet area's (Toilets & Balconies)**	**322 days**	**Fri 08/07/16**	**Thu 25/05/17**
222	Waterproofing Materials delivered to site	5 days	Fri 08/07/16	Tue 12/07/16
223	Ground floor	7 days	Wed 13/07/16	Tue 19/07/16
224	1st floor	15 days	Wed 20/07/16	Wed 03/08/16
225	2nd floor	15 days	Thu 04/08/16	Thu 18/08/16
226	3rd floor	15 days	Fri 19/08/16	Fri 02/09/16
227	4th floor	15 days	Tue 13/09/16	Tue 27/09/16
228	5th floor	15 days	Sat 08/10/16	Sat 22/10/16
229	6th floor	15 days	Wed 02/11/16	Wed 16/11/16
230	7th floor	15 days	Sun 27/11/16	Sun 11/12/16
231	8th floor	15 days	Thu 22/12/16	Thu 05/01/17
232	9th floor	15 days	Mon 16/01/17	Mon 30/01/17
233	10th floor	15 days	Fri 10/02/17	Fri 24/02/17
234	11th floor	15 days	Tue 07/03/17	Tue 21/03/17
235	12th floor	15 days	Sat 01/04/17	Sat 15/04/17
236	13th floor	15 days	Wed 26/04/17	Wed 10/05/17
237	Terrace floor (incl pool, water features)	15 days	Thu 11/05/17	Thu 25/05/17
238	**Screeding works**	**354 days**	**Mon 13/06/16**	**Thu 01/06/17**
239	**General area's floor screeding**	**354 days**	**Mon 13/06/16**	**Thu 01/06/17**
240	Basement floor	7 days	Sat 03/09/16	Fri 09/09/16
241	Ground floor	7 days	Sat 27/08/16	Fri 02/09/16
242	1st floor	7 days	Mon 13/06/16	Sun 19/06/16
243	2nd floor	7 days	Fri 08/07/16	Thu 14/07/16
244	3rd floor	7 days	Tue 02/08/16	Mon 08/08/16
245	4th floor	7 days	Sat 27/08/16	Fri 02/09/16
246	5th floor	7 days	Wed 21/09/16	Tue 27/09/16
247	6th floor	7 days	Sun 16/10/16	Sat 22/10/16
248	7th floor	7 days	Thu 10/11/16	Wed 16/11/16
249	8th floor	7 days	Mon 05/12/16	Sun 11/12/16
250	9th floor	7 days	Fri 30/12/16	Thu 05/01/17
251	10th floor	7 days	Tue 24/01/17	Mon 30/01/17
252	11th floor	7 days	Sat 18/02/17	Fri 24/02/17
253	12th floor	7 days	Wed 15/03/17	Tue 21/03/17
254	13th floor	7 days	Sun 09/04/17	Sat 15/04/17
255	Terrace floor	7 days	Fri 26/05/17	Thu 01/06/17
256	Staircase area's	15 days	Sun 16/04/17	Sun 30/04/17
257	**Toilet & Balconies floor screeding**	**270 days**	**Sun 21/08/16**	**Wed 17/05/17**
258	Ground floor	5 days	Wed 31/08/16	Sun 04/09/16
259	1st floor	5 days	Fri 26/08/16	Tue 30/08/16
260	2nd floor	5 days	Sun 21/08/16	Thu 25/08/16
261	3rd floor	5 days	Mon 05/09/16	Fri 09/09/16
262	4th floor	5 days	Fri 30/09/16	Tue 04/10/16
263	5th floor	5 days	Tue 25/10/16	Sat 29/10/16
264	6th floor	5 days	Sat 19/11/16	Wed 23/11/16
265	7th floor	5 days	Wed 14/12/16	Sun 18/12/16



Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
266	8th floor	5 days	Sun 08/01/17	Thu 12/01/17
267	9th floor	5 days	Thu 02/02/17	Mon 06/02/17
268	10th floor	5 days	Mon 27/02/17	Fri 03/03/17
269	11th floor	5 days	Fri 24/03/17	Tue 28/03/17
270	12th floor	5 days	Tue 18/04/17	Sat 22/04/17
271	13th floor	5 days	Sat 13/05/17	Wed 17/05/17
272	**Metal Works & Wood works**	**75 days**	**Sun 16/04/17**	**Thu 29/06/17**
273	**Staircase Hand railing**	**65 days**	**Sun 16/04/17**	**Mon 19/06/17**
274	Materials delivered to site	1 day	Sun 16/04/17	Sun 16/04/17
275	Ground floor to Basement	4 days	Fri 21/04/17	Mon 24/04/17
276	1st floor	4 days	Tue 25/04/17	Fri 28/04/17
277	2nd floor	4 days	Sat 29/04/17	Tue 02/05/17
278	3rd floor	4 days	Wed 03/05/17	Sat 06/05/17
279	4th floor	4 days	Sun 07/05/17	Wed 10/05/17
280	5th floor	4 days	Thu 11/05/17	Sun 14/05/17
281	6th floor	4 days	Mon 15/05/17	Thu 18/05/17
282	7th floor	4 days	Fri 19/05/17	Mon 22/05/17
283	8th floor	4 days	Tue 23/05/17	Fri 26/05/17
284	9th floor	4 days	Sat 27/05/17	Tue 30/05/17
285	10th floor	4 days	Wed 31/05/17	Sat 03/06/17
286	11th floor	4 days	Sun 04/06/17	Wed 07/06/17
287	12th floor	4 days	Thu 08/06/17	Sun 11/06/17
288	13th floor	4 days	Mon 12/06/17	Thu 15/06/17
289	Terrace floor to 13th floor	4 days	Fri 16/06/17	Mon 19/06/17
290	**Balcony & Parapet railing**	**62 days**	**Sat 29/04/17**	**Thu 29/06/17**
291	1st floor	4 days	Sat 29/04/17	Tue 02/05/17
292	2nd floor	4 days	Wed 03/05/17	Sat 06/05/17
293	3rd floor	4 days	Sun 07/05/17	Wed 10/05/17
294	4th floor	4 days	Thu 11/05/17	Sun 14/05/17
295	5th floor	4 days	Mon 15/05/17	Thu 18/05/17
296	6th floor	4 days	Fri 19/05/17	Mon 22/05/17
297	7th floor	4 days	Tue 23/05/17	Fri 26/05/17
298	8th floor	4 days	Sat 27/05/17	Tue 30/05/17
299	9th floor	4 days	Wed 31/05/17	Sat 03/06/17
300	10th floor	4 days	Sun 04/06/17	Wed 07/06/17
301	11th floor	4 days	Thu 08/06/17	Sun 11/06/17
302	12th floor	4 days	Mon 12/06/17	Thu 15/06/17
303	13th floor	4 days	Fri 16/06/17	Mon 19/06/17
304	Terrace - Parapet railing, Pool Glass railing	10 days	Tue 20/06/17	Thu 29/06/17
305	**Wood Works**	**10 days**	**Wed 07/06/17**	**Fri 16/06/17**
306	Pool Deck with steps	10 days	Wed 07/06/17	Fri 16/06/17
307	**Ceiling Works**	**291 days**	**Wed 31/08/16**	**Sat 17/06/17**
308	**Shop Ceiling with Cement board**	**20 days**	**Wed 31/08/16**	**Mon 19/09/16**
309	Materials delivered to site	2 days	Wed 31/08/16	Thu 01/09/16
310	Ground floor	10 days	Sat 10/09/16	Mon 19/09/16
311	**Toilet Ceiling with Cement board**	**268 days**	**Fri 23/09/16**	**Sat 17/06/17**
312	1st floor	3 days	Fri 23/09/16	Sun 25/09/16
313	2nd floor	3 days	Mon 03/10/16	Wed 05/10/16
314	3rd floor	3 days	Thu 13/10/16	Sat 15/10/16
315	4th floor	3 days	Sun 23/10/16	Tue 25/10/16
316	5th floor	3 days	Sat 12/11/16	Mon 14/11/16
317	6th floor	3 days	Wed 07/12/16	Fri 09/12/16
318	7th floor	3 days	Sun 01/01/17	Tue 03/01/17
319	8th floor	3 days	Thu 26/01/17	Sat 28/01/17
320	9th floor	3 days	Mon 20/02/17	Wed 22/02/17
321	10th floor	3 days	Fri 17/03/17	Sun 19/03/17
322	11th floor	3 days	Tue 11/04/17	Thu 13/04/17
323	12th floor	3 days	Sat 06/05/17	Mon 08/05/17
324	13th floor	3 days	Wed 31/05/17	Fri 02/06/17
325	Terrace floor	3 days	Thu 15/06/17	Sat 17/06/17
326	**Doors & Windows installation**	**292 days**	**Sat 03/09/16**	**Wed 21/06/17**
327	**Doors installation (Timber & Aluminium)**	**282 days**	**Sat 03/09/16**	**Sun 11/06/17**
328	Materials delivered to site	2 days	Sat 03/09/16	Sun 04/09/16



RAINBOW CONSTRUCTION PVT,LTD.

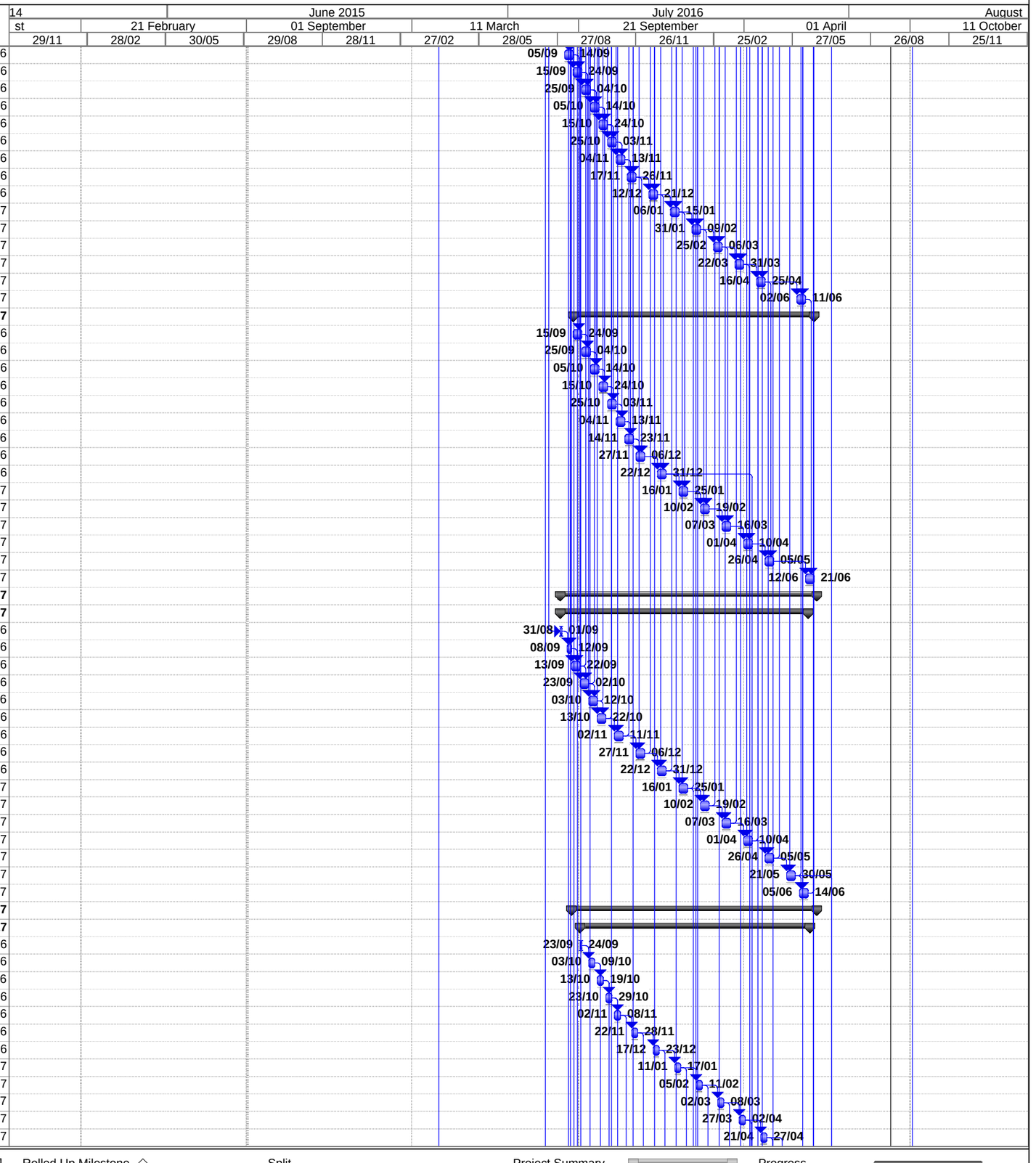
Task | Summary | Rolled Up Milestone ◇ | Split | Project Summary | Progress

Milestone ◆ | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline ⇩

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
329	Ground floor	10 days	Mon 05/09/16	Wed 14/09/16
330	1st floor	10 days	Thu 15/09/16	Sat 24/09/16
331	2nd floor	10 days	Sun 25/09/16	Tue 04/10/16
332	3rd floor	10 days	Wed 05/10/16	Fri 14/10/16
333	4th floor	10 days	Sat 15/10/16	Mon 24/10/16
334	5th floor	10 days	Tue 25/10/16	Thu 03/11/16
335	6th floor	10 days	Fri 04/11/16	Sun 13/11/16
336	7th floor	10 days	Thu 17/11/16	Sat 26/11/16
337	8th floor	10 days	Mon 12/12/16	Wed 21/12/16
338	9th floor	10 days	Fri 06/01/17	Sun 15/01/17
339	10th floor	10 days	Tue 31/01/17	Thu 09/02/17
340	11th floor	10 days	Sat 25/02/17	Mon 06/03/17
341	12th floor	10 days	Wed 22/03/17	Fri 31/03/17
342	13th floor	10 days	Sun 16/04/17	Tue 25/04/17
343	Terrace floor	10 days	Fri 02/06/17	Sun 11/06/17
344	**Windows installation**	**280 days**	**Thu 15/09/16**	**Wed 21/06/17**
345	Ground floor	10 days	Thu 15/09/16	Sat 24/09/16
346	1st floor	10 days	Sun 25/09/16	Tue 04/10/16
347	2nd floor	10 days	Wed 05/10/16	Fri 14/10/16
348	3rd floor	10 days	Sat 15/10/16	Mon 24/10/16
349	4th floor	10 days	Tue 25/10/16	Thu 03/11/16
350	5th floor	10 days	Fri 04/11/16	Sun 13/11/16
351	6th floor	10 days	Mon 14/11/16	Wed 23/11/16
352	7th floor	10 days	Sun 27/11/16	Tue 06/12/16
353	8th floor	10 days	Thu 22/12/16	Sat 31/12/16
354	9th floor	10 days	Mon 16/01/17	Wed 25/01/17
355	10th floor	10 days	Fri 10/02/17	Sun 19/02/17
356	11th floor	10 days	Tue 07/03/17	Thu 16/03/17
357	12th floor	10 days	Sat 01/04/17	Mon 10/04/17
358	13th floor	10 days	Wed 26/04/17	Fri 05/05/17
359	Terrace floor	10 days	Mon 12/06/17	Wed 21/06/17
360	**Finishes (Tiling)**	**298 days**	**Wed 31/08/16**	**Sat 24/06/17**
361	**Toilet Tiling**	**288 days**	**Wed 31/08/16**	**Wed 14/06/17**
362	Materials delivered to site	2 days	Wed 31/08/16	Thu 01/09/16
363	Ground floor	5 days	Thu 08/09/16	Mon 12/09/16
364	1st floor	10 days	Tue 13/09/16	Thu 22/09/16
365	2nd floor	10 days	Fri 23/09/16	Sun 02/10/16
366	3rd floor	10 days	Mon 03/10/16	Wed 12/10/16
367	4th floor	10 days	Thu 13/10/16	Sat 22/10/16
368	5th floor	10 days	Wed 02/11/16	Fri 11/11/16
369	6th floor	10 days	Sun 27/11/16	Tue 06/12/16
370	7th floor	10 days	Thu 22/12/16	Sat 31/12/16
371	8th floor	10 days	Mon 16/01/17	Wed 25/01/17
372	9th floor	10 days	Fri 10/02/17	Sun 19/02/17
373	10th floor	10 days	Tue 07/03/17	Thu 16/03/17
374	11th floor	10 days	Sat 01/04/17	Mon 10/04/17
375	12th floor	10 days	Wed 26/04/17	Fri 05/05/17
376	13th floor	10 days	Sun 21/05/17	Tue 30/05/17
377	Terrace floor & Swimming pool Tiling	10 days	Mon 05/06/17	Wed 14/06/17
378	**General area's floor Tiling**	**285 days**	**Tue 13/09/16**	**Sat 24/06/17**
395	**Kitchen Cabinet Installation (incl Tiling)**	**267 days**	**Fri 23/09/16**	**Fri 16/06/17**
396	Materials delivered to site	2 days	Fri 23/09/16	Sat 24/09/16
397	1st floor	7 days	Mon 03/10/16	Sun 09/10/16
398	2nd floor	7 days	Thu 13/10/16	Wed 19/10/16
399	3rd floor	7 days	Sun 23/10/16	Sat 29/10/16
400	4th floor	7 days	Wed 02/11/16	Tue 08/11/16
401	5th floor	7 days	Tue 22/11/16	Mon 28/11/16
402	6th floor	7 days	Sat 17/12/16	Fri 23/12/16
403	7th floor	7 days	Wed 11/01/17	Tue 17/01/17
404	8th floor	7 days	Sun 05/02/17	Sat 11/02/17
405	9th floor	7 days	Thu 02/03/17	Wed 08/03/17
406	10th floor	7 days	Mon 27/03/17	Sun 02/04/17
407	11th floor	7 days	Fri 21/04/17	Thu 27/04/17



RAINBOW CONSTRUCTION PVT,LTD.

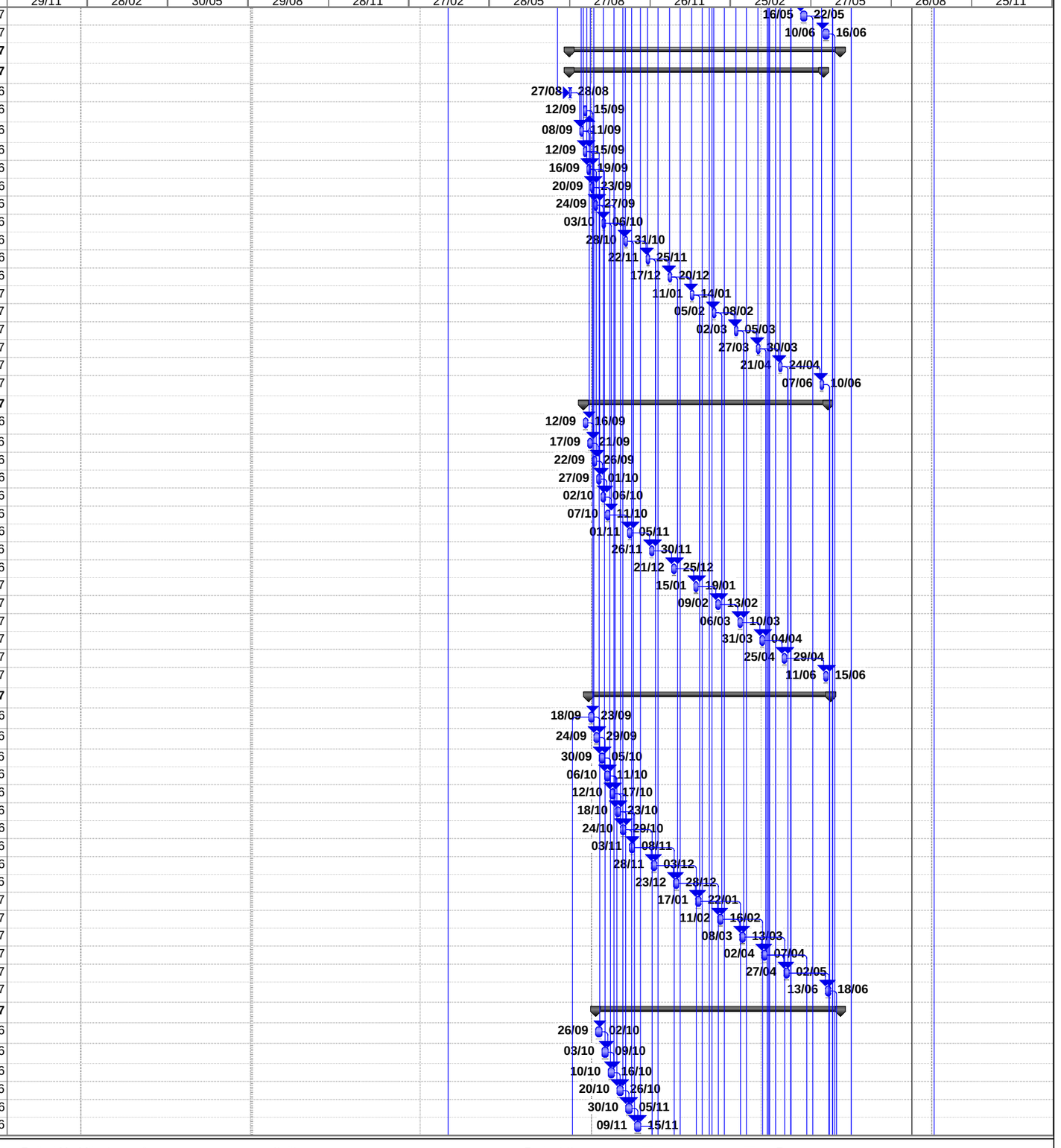
Task | Summary | Rolled Up Milestone | Split | Project Summary | Progress

Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
408	12th floor	7 days	Tue 16/05/17	Mon 22/05/17
409	13th floor	7 days	Sat 10/06/17	Fri 16/06/17
410	**Painting**	**307 days**	**Sat 27/08/16**	**Thu 29/06/17**
411	**Internal primer application**	**288 days**	**Sat 27/08/16**	**Sat 10/06/17**
412	Materials delivered to site	2 days	Sat 27/08/16	Sun 28/08/16
413	Basement floor	4 days	Mon 12/09/16	Thu 15/09/16
414	Ground floor	4 days	Thu 08/09/16	Sun 11/09/16
415	1st floor	4 days	Mon 12/09/16	Thu 15/09/16
416	2nd floor	4 days	Fri 16/09/16	Mon 19/09/16
417	3rd floor	4 days	Tue 20/09/16	Fri 23/09/16
418	4th floor	4 days	Sat 24/09/16	Tue 27/09/16
419	5th floor	4 days	Mon 03/10/16	Thu 06/10/16
420	6th floor	4 days	Fri 28/10/16	Mon 31/10/16
421	7th floor	4 days	Tue 22/11/16	Fri 25/11/16
422	8th floor	4 days	Sat 17/12/16	Tue 20/12/16
423	9th floor	4 days	Wed 11/01/17	Sat 14/01/17
424	10th floor	4 days	Sun 05/02/17	Wed 08/02/17
425	11th floor	4 days	Thu 02/03/17	Sun 05/03/17
426	12th floor	4 days	Mon 27/03/17	Thu 30/03/17
427	13th floor	4 days	Fri 21/04/17	Mon 24/04/17
428	Terrace floor	4 days	Wed 07/06/17	Sat 10/06/17
429	**Plaster Cornice works**	**277 days**	**Mon 12/09/16**	**Thu 15/06/17**
430	Ground floor	5 days	Mon 12/09/16	Fri 16/09/16
431	1st floor	5 days	Sat 17/09/16	Wed 21/09/16
432	2nd floor	5 days	Thu 22/09/16	Mon 26/09/16
433	3rd floor	5 days	Tue 27/09/16	Sat 01/10/16
434	4th floor	5 days	Sun 02/10/16	Thu 06/10/16
435	5th floor	5 days	Fri 07/10/16	Tue 11/10/16
436	6th floor	5 days	Tue 01/11/16	Sat 05/11/16
437	7th floor	5 days	Sat 26/11/16	Wed 30/11/16
438	8th floor	5 days	Wed 21/12/16	Sun 25/12/16
439	9th floor	5 days	Sun 15/01/17	Thu 19/01/17
440	10th floor	5 days	Thu 09/02/17	Mon 13/02/17
441	11th floor	5 days	Mon 06/03/17	Fri 10/03/17
442	12th floor	5 days	Fri 31/03/17	Tue 04/04/17
443	13th floor	5 days	Tue 25/04/17	Sat 29/04/17
444	Terrace floor	5 days	Sun 11/06/17	Thu 15/06/17
445	**Putty application & Sandoring/Grinding**	**274 days**	**Sun 18/09/16**	**Sun 18/06/17**
446	Basement floor	6 days	Sun 18/09/16	Fri 23/09/16
447	Ground floor	6 days	Sat 24/09/16	Thu 29/09/16
448	1st floor	6 days	Fri 30/09/16	Wed 05/10/16
449	2nd floor	6 days	Thu 06/10/16	Tue 11/10/16
450	3rd floor	6 days	Wed 12/10/16	Mon 17/10/16
451	4th floor	6 days	Tue 18/10/16	Sun 23/10/16
452	5th floor	6 days	Mon 24/10/16	Sat 29/10/16
453	6th floor	6 days	Thu 03/11/16	Tue 08/11/16
454	7th floor	6 days	Mon 28/11/16	Sat 03/12/16
455	8th floor	6 days	Fri 23/12/16	Wed 28/12/16
456	9th floor	6 days	Tue 17/01/17	Sun 22/01/17
457	10th floor	6 days	Sat 11/02/17	Thu 16/02/17
458	11th floor	6 days	Wed 08/03/17	Mon 13/03/17
459	12th floor	6 days	Sun 02/04/17	Fri 07/04/17
460	13th floor	6 days	Thu 27/04/17	Tue 02/05/17
461	Terrace floor	6 days	Tue 13/06/17	Sun 18/06/17
462	**Paint top coat**	**277 days**	**Mon 26/09/16**	**Thu 29/06/17**
463	Basement floor	7 days	Mon 26/09/16	Sun 02/10/16
464	Ground floor	7 days	Mon 03/10/16	Sun 09/10/16
465	1st floor	7 days	Mon 10/10/16	Sun 16/10/16
466	2nd floor	7 days	Thu 20/10/16	Wed 26/10/16
467	3rd floor	7 days	Sun 30/10/16	Sat 05/11/16
468	4th floor	7 days	Wed 09/11/16	Tue 15/11/16



RAINBOW CONSTRUCTION PVT,LTD.

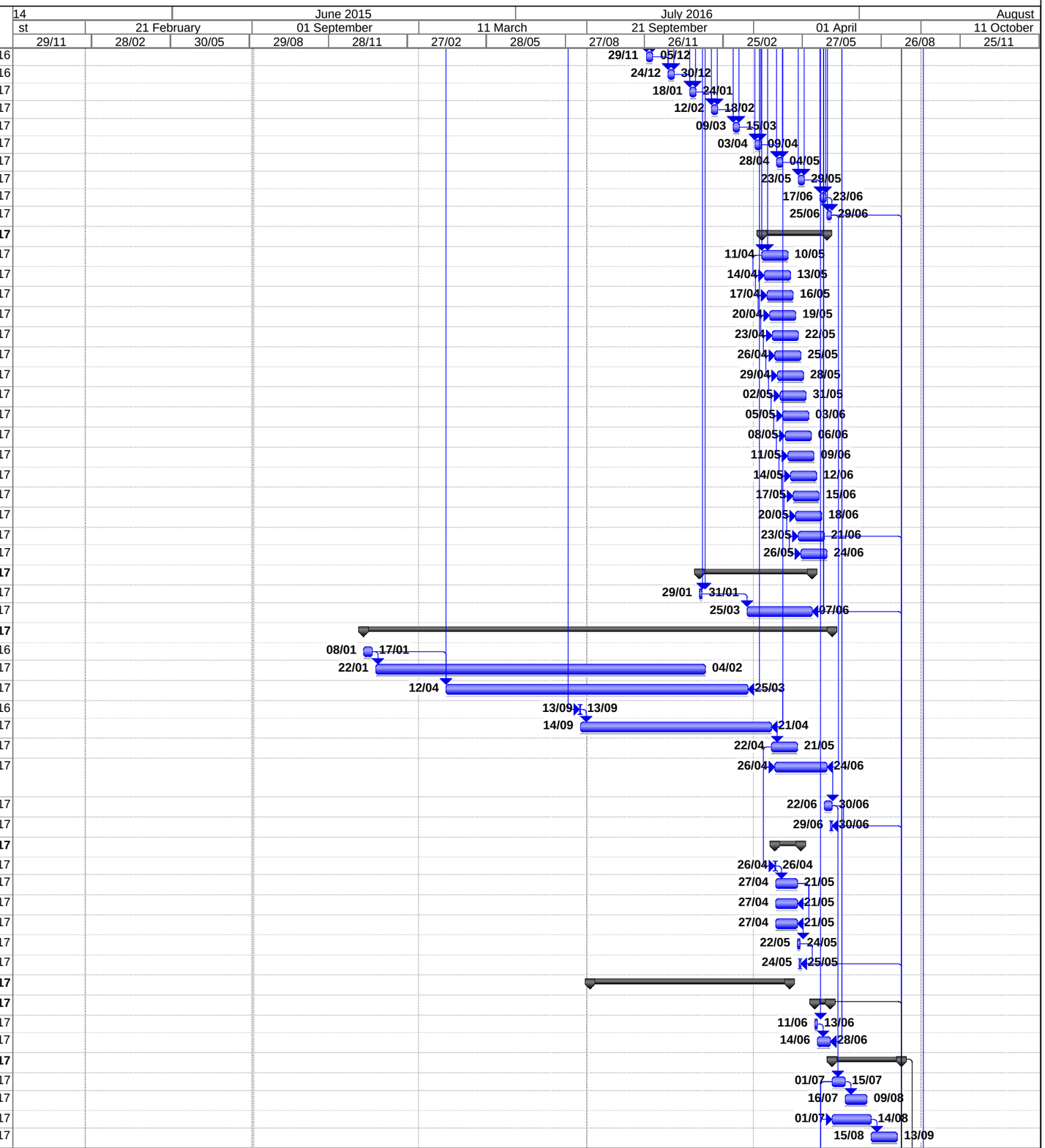
Task | Summary | Rolled Up Milestone ◇ | Split | Project Summary | Progress

Milestone ◆ | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline ⇩

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

ID	Task Name	Duration	Start	Finish
469	5th floor	7 days	Tue 29/11/16	Mon 05/12/16
470	6th floor	7 days	Sat 24/12/16	Fri 30/12/16
471	7th floor	7 days	Wed 18/01/17	Tue 24/01/17
472	8th floor	7 days	Sun 12/02/17	Sat 18/02/17
473	9th floor	7 days	Thu 09/03/17	Wed 15/03/17
474	10th floor	7 days	Mon 03/04/17	Sun 09/04/17
475	11th floor	7 days	Fri 28/04/17	Thu 04/05/17
476	12th floor	7 days	Tue 23/05/17	Mon 29/05/17
477	13th floor	7 days	Sat 17/06/17	Fri 23/06/17
478	Terrace floor	5 days	Sun 25/06/17	Thu 29/06/17
479	**External painting**	**75 days**	**Tue 11/04/17**	**Sat 24/06/17**
480	Terrace Floor	30 days	Tue 11/04/17	Wed 10/05/17
481	13th floor	30 days	Fri 14/04/17	Sat 13/05/17
482	12th floor	30 days	Mon 17/04/17	Tue 16/05/17
483	11th floor	30 days	Thu 20/04/17	Fri 19/05/17
484	10th floor	30 days	Sun 23/04/17	Mon 22/05/17
485	9th floor	30 days	Wed 26/04/17	Thu 25/05/17
486	8th floor	30 days	Sat 29/04/17	Sun 28/05/17
487	7th floor	30 days	Tue 02/05/17	Wed 31/05/17
488	6th floor	30 days	Fri 05/05/17	Sat 03/06/17
489	5th floor	30 days	Mon 08/05/17	Tue 06/06/17
490	4th floor	30 days	Thu 11/05/17	Fri 09/06/17
491	3rd floor	30 days	Sun 14/05/17	Mon 12/06/17
492	2nd floor	30 days	Wed 17/05/17	Thu 15/06/17
493	1st floor	30 days	Sat 20/05/17	Sun 18/06/17
494	Ground floor	30 days	Tue 23/05/17	Wed 21/06/17
495	Basement floor	30 days	Fri 26/05/17	Sat 24/06/17
496	**Bath room Accessories**	**130 days**	**Sun 29/01/17**	**Wed 07/06/17**
497	Materials delivered to site	3 days	Sun 29/01/17	Tue 31/01/17
498	Installation	75 days	Sat 25/03/17	Wed 07/06/17
499	**Electrical Installation**	**540 days**	**Fri 08/01/16**	**Fri 30/06/17**
500	Shop drawings approvals	10 days	Fri 08/01/16	Sun 17/01/16
501	Slab conduiting at All floors	380 days	Fri 22/01/16	Sat 04/02/17
502	Wall conduiting at All floors	348 days	Tue 12/04/16	Sat 25/03/17
503	Materials delivered to site	1 day	Tue 13/09/16	Tue 13/09/16
504	Wiring at All floors	220 days	Wed 14/09/16	Fri 21/04/17
505	DB Installtion at All floors	30 days	Sat 22/04/17	Sun 21/05/17
506	Lights & Fan & Switches & Fixtures fixing at All floors	60 days	Wed 26/04/17	Sat 24/06/17
507	Panel Board Installation & Main cabling	9 days	Thu 22/06/17	Fri 30/06/17
508	Testing & Commisioning	2 days	Thu 29/06/17	Fri 30/06/17
509	**Fire fighting system Installation**	**30 days**	**Wed 26/04/17**	**Thu 25/05/17**
510	Materials delivered to site	1 day	Wed 26/04/17	Wed 26/04/17
511	Fire extinguishers installation	25 days	Thu 27/04/17	Sun 21/05/17
512	Fire alarm fixtures installation	25 days	Thu 27/04/17	Sun 21/05/17
513	Hose reel and landing Valve installation	25 days	Thu 27/04/17	Sun 21/05/17
514	Fire Alarm panel Installation & Main cabling	3 days	Mon 22/05/17	Wed 24/05/17
515	Testing & Commisioning	2 days	Wed 24/05/17	Thu 25/05/17
516	**Lifts**	**230 days**	**Sun 25/09/16**	**Fri 12/05/17**
522	**Gym & Pool equipments**	**18 days**	**Sun 11/06/17**	**Wed 28/06/17**
523	Materials delivered to site	3 days	Sun 11/06/17	Tue 13/06/17
524	Installation	15 days	Wed 14/06/17	Wed 28/06/17
525	**Addition - Common/Public area works**	**80 days**	**Sat 01/07/17**	**Mon 18/09/17**
526	Erection of Transformer	15 days	Sat 01/07/17	Sat 15/07/17
527	Main cabling	25 days	Sun 16/07/17	Wed 09/08/17
528	service room provisions in all floor	45 days	Sat 01/07/17	Mon 14/08/17
529	Garbage duct works	30 days	Tue 15/08/17	Wed 13/09/17



RAINBOW CONSTRUCTION PVT,LTD.

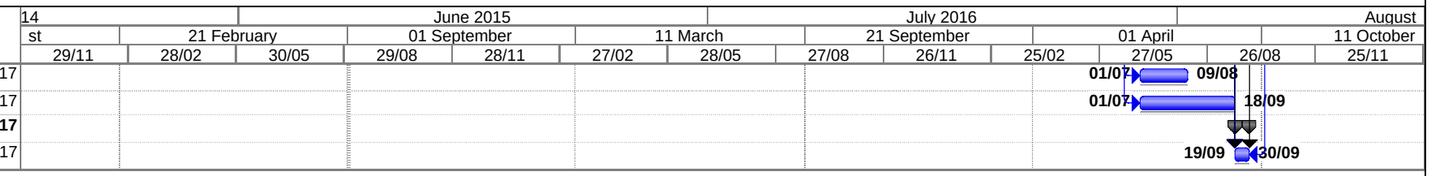
Task | Summary | Rolled Up Milestone ◇ | Split | Project Summary | Progress

Milestone ◆ | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline ⇩

Work schedule

CONSTRUCTION OF 15 STOREY BUILDING AT MA.MANAAGE

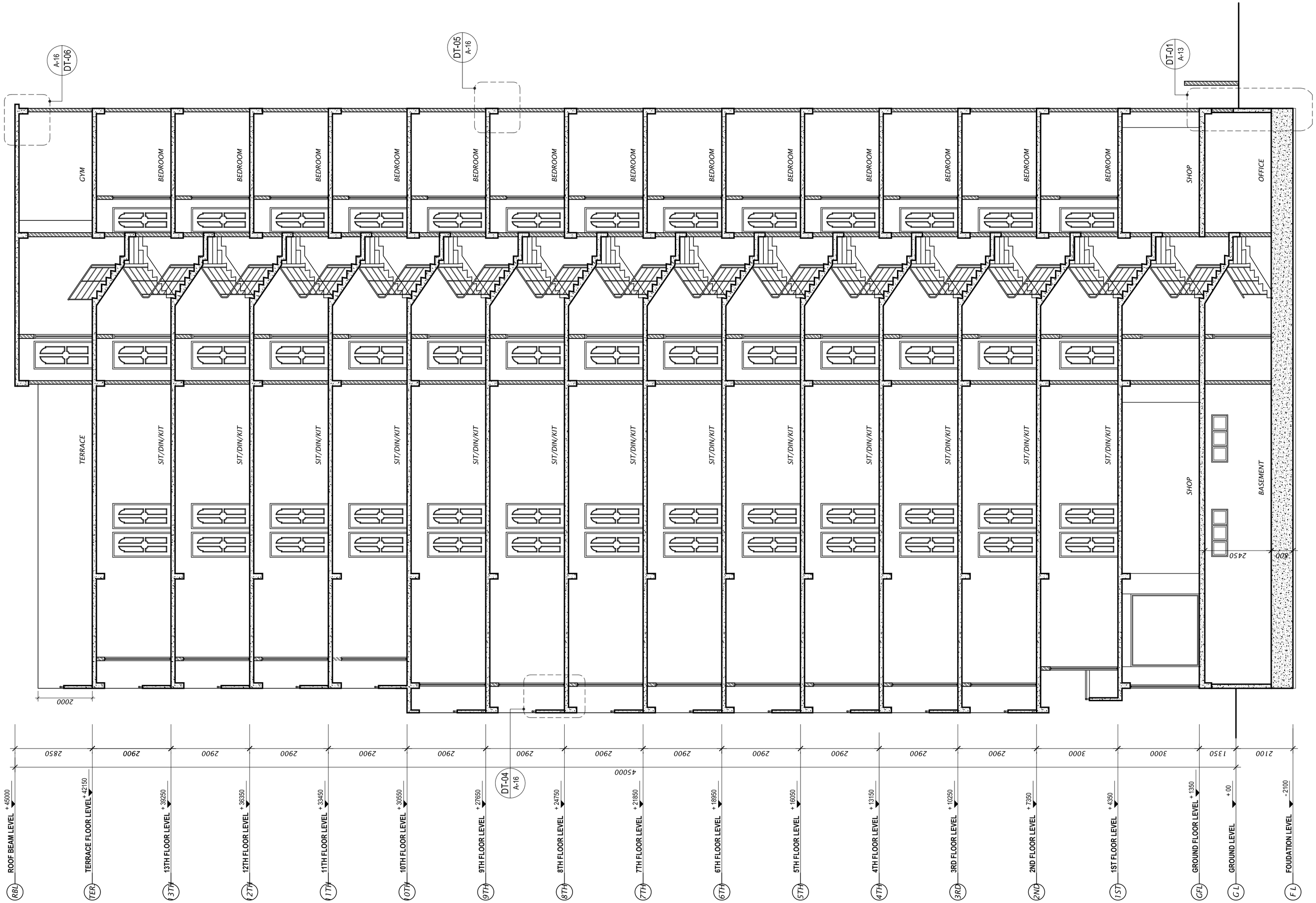
ID	Task Name	Duration	Start	Finish
530	Basement works - other than Structure	40 days	Sat 01/07/17	Wed 09/08/17
531	Attending all Handing over check list at all floors	80 days	Sat 01/07/17	Mon 18/09/17
532	**Final Cleaning & hand over**	**12 days**	**Tue 19/09/17**	**Sat 30/09/17**
533	Final Cleaning/Demobilze	12 days	Tue 19/09/17	Sat 30/09/17



RAINBOW CONSTRUCTION PVT,LTD.

Task | Summary | Rolled Up Milestone ◇ | Split | Project Summary | Progress

Milestone ◆ | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary | Deadline ⇩



SECTION - AA
SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT MA- MANNAGE

Dwg. Title :
SECTION -AA

Client:
RAINBOW CONSTRUCTION

Owner
MR.ABDULLA FAIZ

TEKTON DESIGN ARCHITECTS & ENGINEERS

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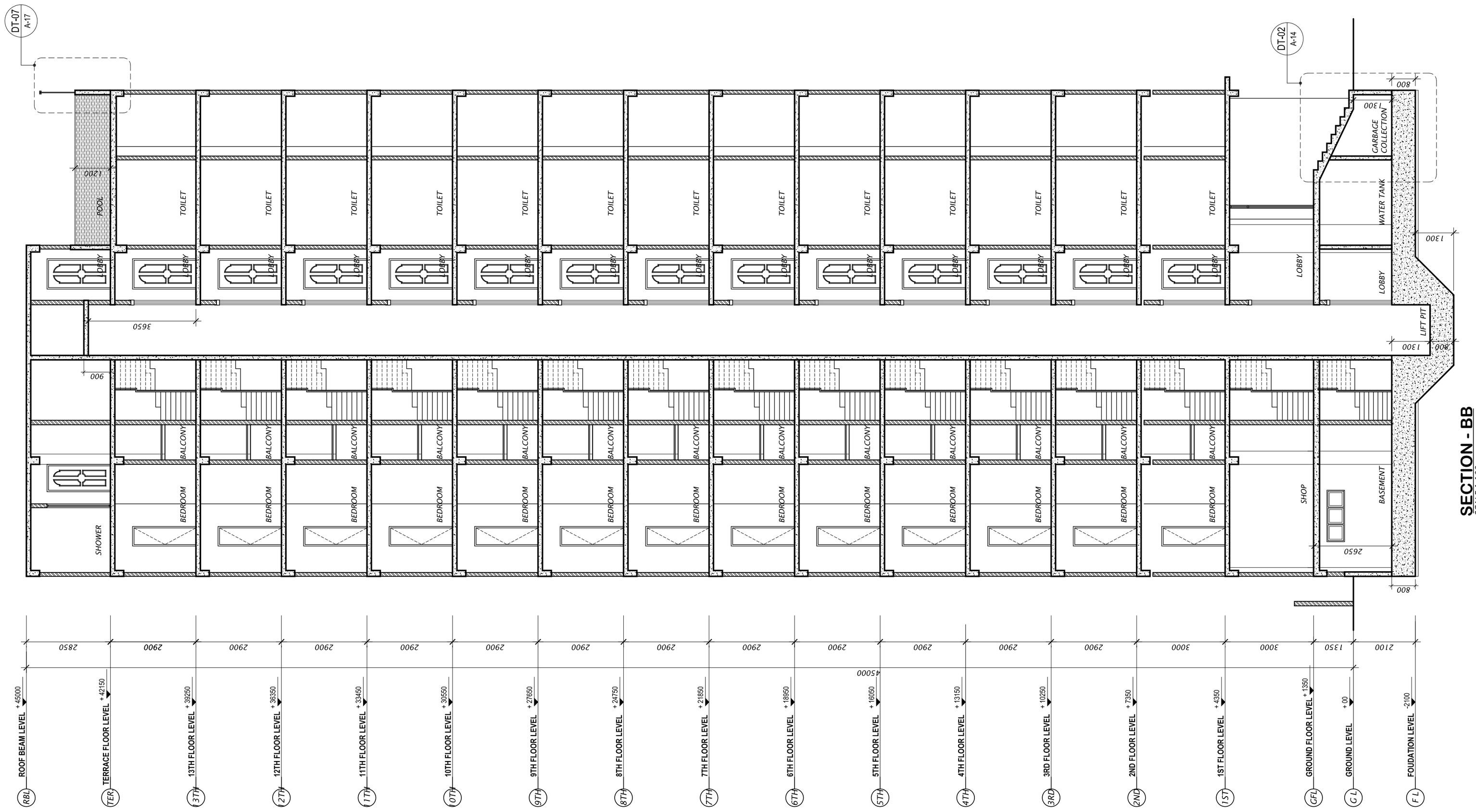
3rd Floor, H. Mialani, Sosun Magu, Male'.
Rep. of Maldives, Tel: (960)32 4959, (960)33 3639, Fax: (960)32 7374
EMRI: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	**Job No:** TD-1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG - A - SEC01- 10



SECTION - BB
SCALE 1:100

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT MA- MANNAGE

Dwg. Title :
SECTION -BB

Client:
RAINBOW CONSTRUCTION

Owner
MR.ABDULLA FAIZ

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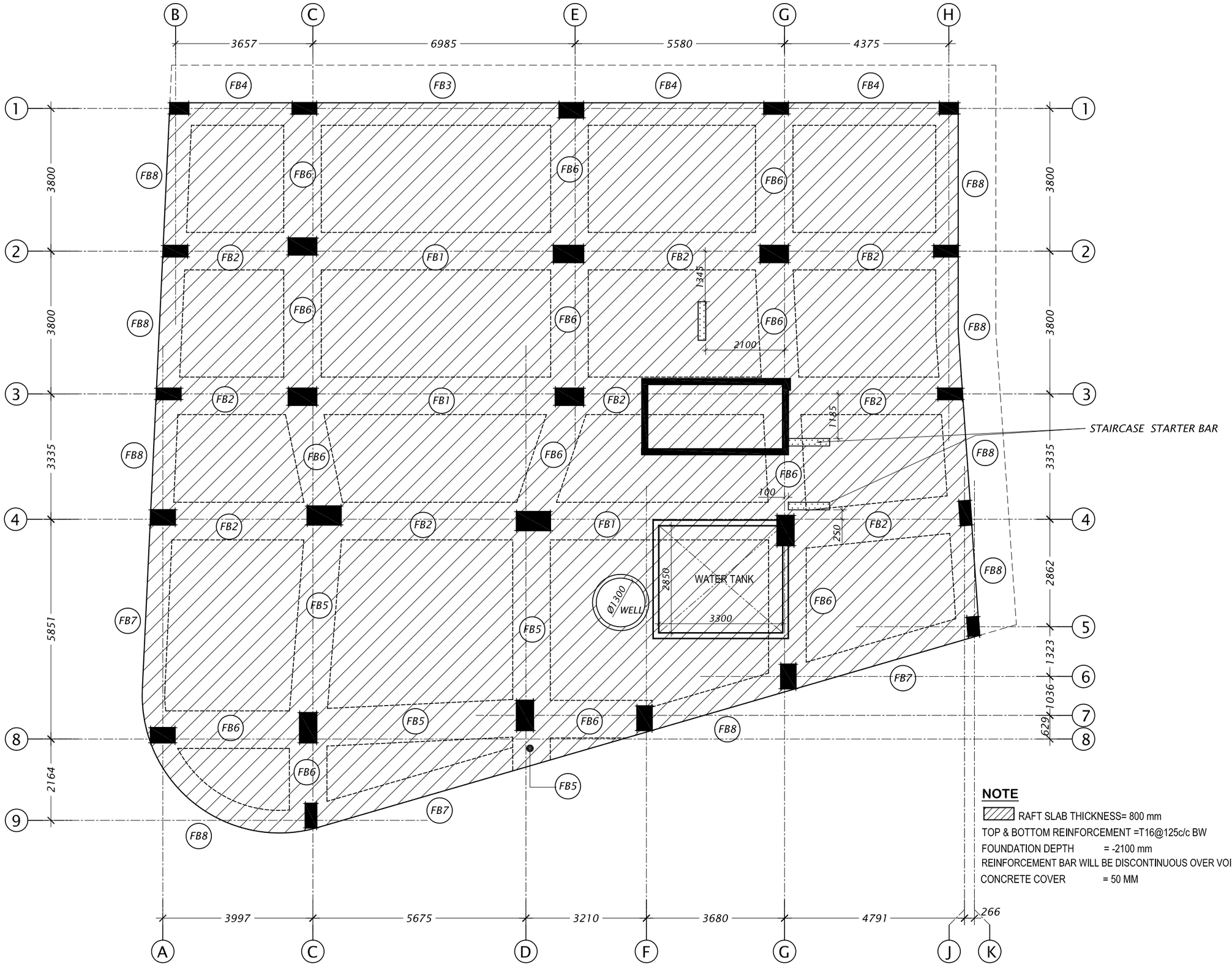
Architect/Designer : Ali Shareef	**Job No:** TD-1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:100

Dwg. No : MNG - A - SEC02- 11



FOUNDATION BEAM PLAN

SCALE 1:100

NOTE

RAFT SLAB THICKNESS= 800 mm

TOP & BOTTOM REINFORCEMENT =T16@125c/c BW

FOUNDATION DEPTH = -2100 mm

REINFORCEMENT BAR WILL BE DISCONTINUOUS OVER VOIDS

CONCRETE COVER = 50 MM

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
FOUNDATION BEAM PLAN

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

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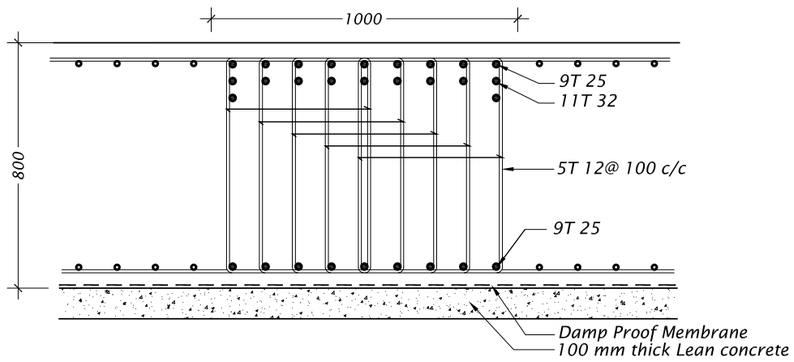
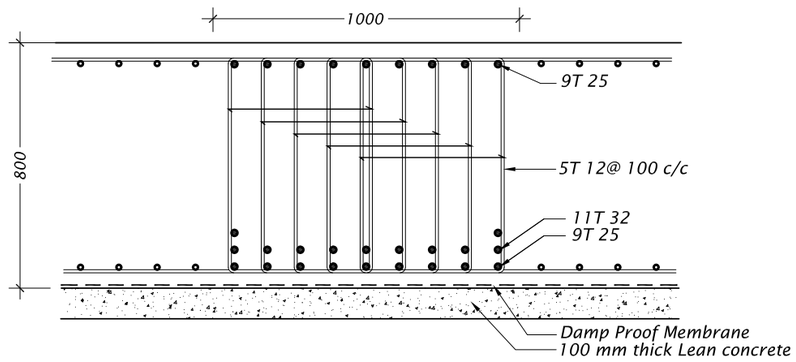
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer : Ali Shareef	Job No: TD - 1108
Struct. Engineer : Shifaz Ali	Rev. No : -
Drawn : Thomas	File No : -
Surveyed : -	Date: 15-12- 2014
Checked/Approved : -	Scale : 1:100

Dwg. No :
MNG -S - FBPL01 - 04

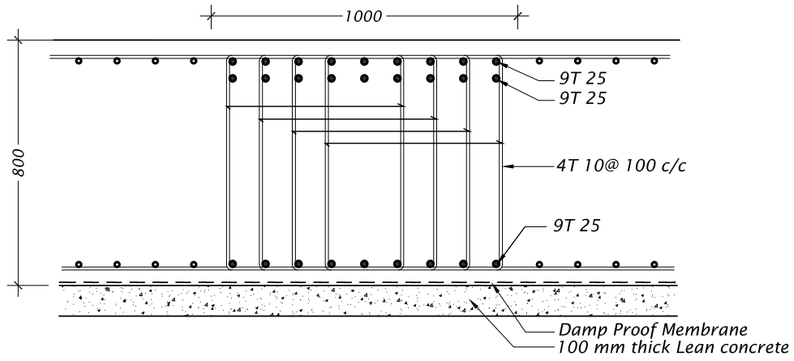


MID SPAN



SUPPORT

FB1



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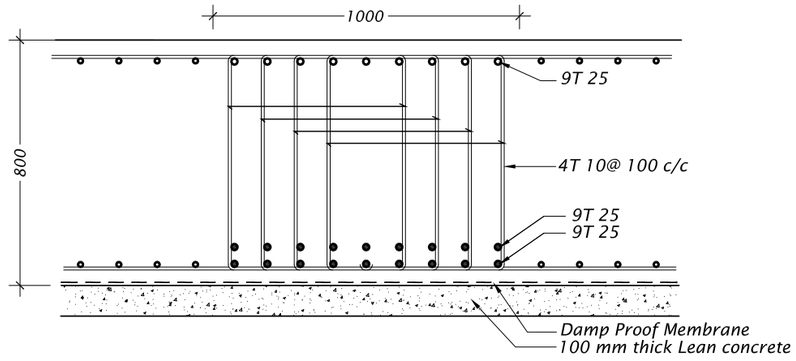
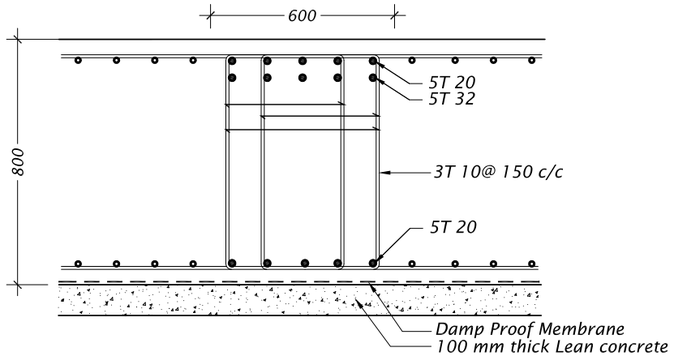


SUPPORT

FB2



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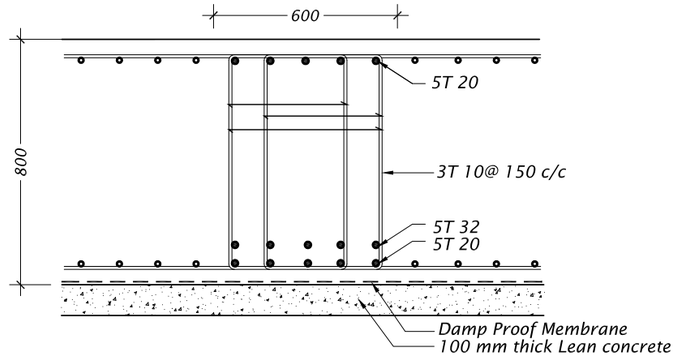

SUPPORT

FB3

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
STRUCTURAL DETAILS

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

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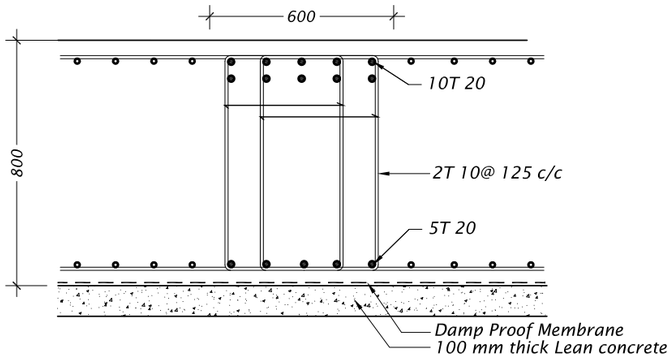
Email: tekton@tektondesign.com.mv, www.tektondesign.com.mv

Architect/Designer :	Job No:
Ali Shareef	TD - 1108
Struct. Engineer :	**Rev. No :**
Shifaz Ali	-
Drawn :	**File No :**
Thomas	-
Surveyed :	**Date:**
-	15-12- 2014
Checked/Approved :	**Scale :**
-	1:20

Dwg. No :
MNG -S - SDTL04 - 26



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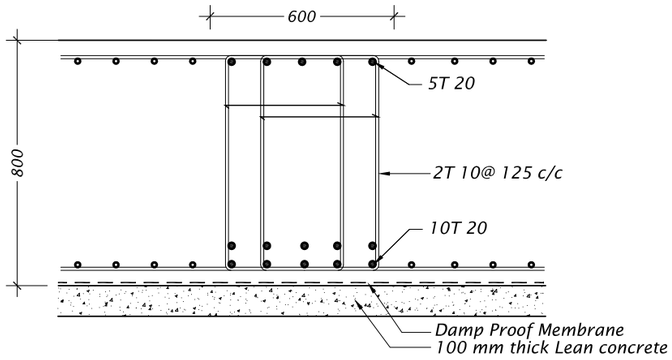
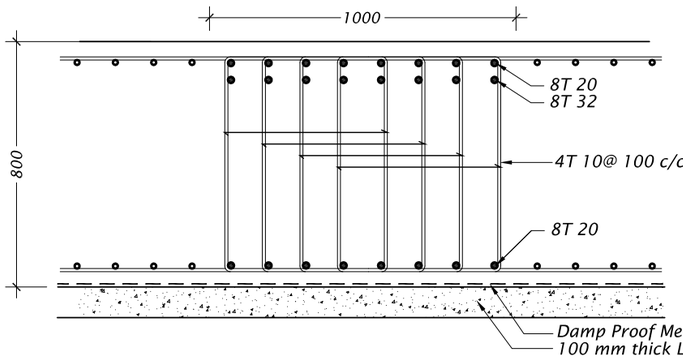


SUPPORT

FB4



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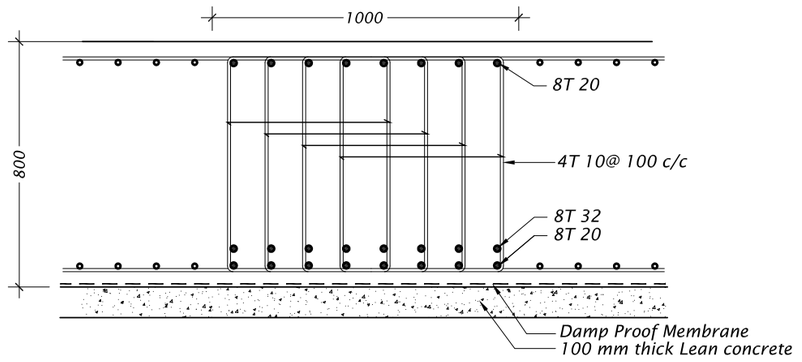
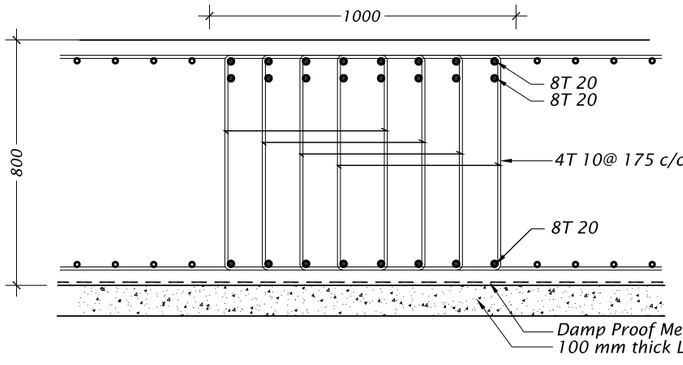


SUPPORT

FB5



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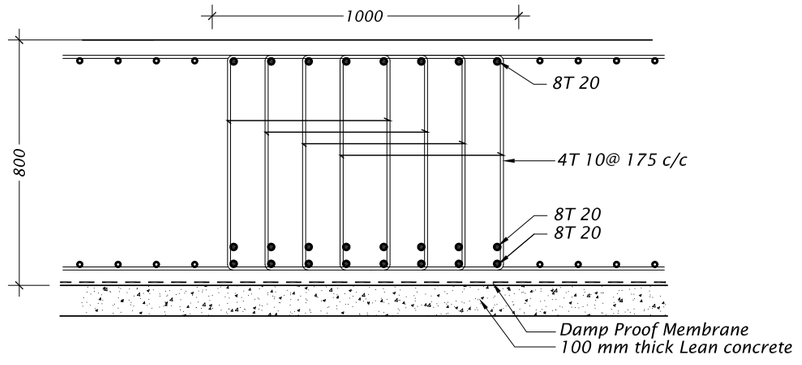

SUPPORT

FB6

NOTES:

No.	Revision/Issue	Date

SUBMISSION DRAWING

Project Title :
PROPOSED 14 STOREY RESIDENTIAL & COMMERCIAL BUILDING AT- MA.MANAAGE

Dwg. Title :
STRUCTURAL DETAILS

Client:
RAINBOW CONSTRUCTION

Owner
MR. ABDULLA FAIZ

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Architect/Designer :	Job No:
Ali Shareef	TD - 1108
Struct. Engineer : Shifaz Ali	**Rev. No :** -
Drawn : Thomas	**File No :** -
Surveyed : -	**Date:** 15-12- 2014
Checked/Approved : -	**Scale :** 1:20

Dwg. No :
MNG -S - SDTL05 - 27

بسم الله الرحمن الرحيم

RAINBOW
CONSTRUCTION (PVT) LTD.

G. Maarana, Alikilegefaanu Magu, Malé 20-04, Republic of Maldives Tel: (+960) 334 0460, Fax: (+960) 332 7374, e-mail: info@rainbowconstruction.com.mv

RC/LTT/2015/114

Yazeed Ahmed
Director
Environmental Protection Agency
Ministry of Environment and Energy
Male', Maldives

7th October 2015

Dear Mr. Yazeed Ahmed,

Project: EIA for the proposed 14 Storey Building Construction in MA. Manaage

Sub: Proponents Commitment for Monitoring and Mitigation

As the proponent of the project, we confirm our commitment to undertake all mitigation measures and carry out the monitoring program as specified in the report.

Thanking you

Yours Sincerely

Mazin Rafeeq

Director

RAINBOW CONSTRUCTION PVT LTD. C-275/2002