TRAFFIC IMPACT ASSESSMENT STUDY

FOR

THE PROPOSED VIPINGO DEVELOPMENT IN KILIFI COUNTY

DRAFT REPORT

19 August 2020

Client	Consultant
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EXECUTIVE SUMMARY

ITEC Engineering Ltd. was commissioned to undertake a Traffic Impact Assessment study for the Vipingo Development in the Vipingo area of Kilifi County. The peak period traffic volumes i.e. Morning peak period (6:00 am – 9:00 am), Lunchtime peak period (12:00am – 2:00pm) and Evening peak period (4:00 pm – 7:00 pm) were recorded on the 24th, 25th and 28th of July 2020, at two (2) traffic census locations. Pedestrian Crossing Volume Counts were also carried out at the same crossings during the same peak periods.

The current traffic volumes were then forecasted assuming a 3-year construction period ending in July 2023 when the initial phase's development is anticipated to be complete and fully operational. The projection was made at a growth rate of 6.4% to determine the future traffic operating conditions and the prevailing levels of service (LOS). Future traffic conditions were determined as the sum of the forecasted current traffic and the generated traffic from the development.

The Levels of Service (LOS) concept, which represents ranges of operating conditions and the driver's perception of those conditions, has been used in assessing current and future traffic conditions. Level of service A represents the best operating conditions and Level of service F represents the worst conditions.

In future (2023) with the expected growth of existing traffic without the proposed development, the road sections will generally remain better than acceptable LOS C on the Mombasa-Malindi (B8) highway, Vipingo Ridge access road and Mombasa Cement access road during both peak periods.

In future (2023), upon the completion of construction and start of operations of this phase of the shopping mall, fuel station, villas and apartments, the Vipingo Ridge junction road sections will remain better than Levels of Service C, but the intersection will have an LOS E due to the right turning movements.

As for the Mombasa Cement junction, a good LOS C will be maintained for through traffic once 30% of operations begin at the Industrial Park in 2023. However, the primary access road sections and intersections at the will deteriorate to Levels of Service F during some peak periods. This indicates that the generated traffic due to the proposed industrial park will have a significant adverse effect to the future motorised traffic operating conditions. Capacity improvement will therefore be required for the Mombasa Cement access road and intersection.

Based on the need to upgrade road and intersection capacity and pedestrian mobility, the proposed short-term (2023) improvements include:

(i) Introduction of medians for right turning traffic along the highway at the intersections;
(ii) Deceleration lanes and storage for right turning traffic at both intersections;
(iii) Deceleration lanes for all left turning traffic;
(iv) Upgrading of the Mombasa Cement access road from a Local road to a Collector road;
(v) Roundabouts and junction treatments i.e. islands and medians, along the Vipingo Boulevard;
(vi) Traffic calming provisions, i.e. flat-topped speed humps and rumble strips;
(vii) Pedestrian provisions i.e. signage, walkways and raised crossings;
(viii) PSV provisions i.e. bus stops and laybys; and,

(ix) Street lighting and landscaping.

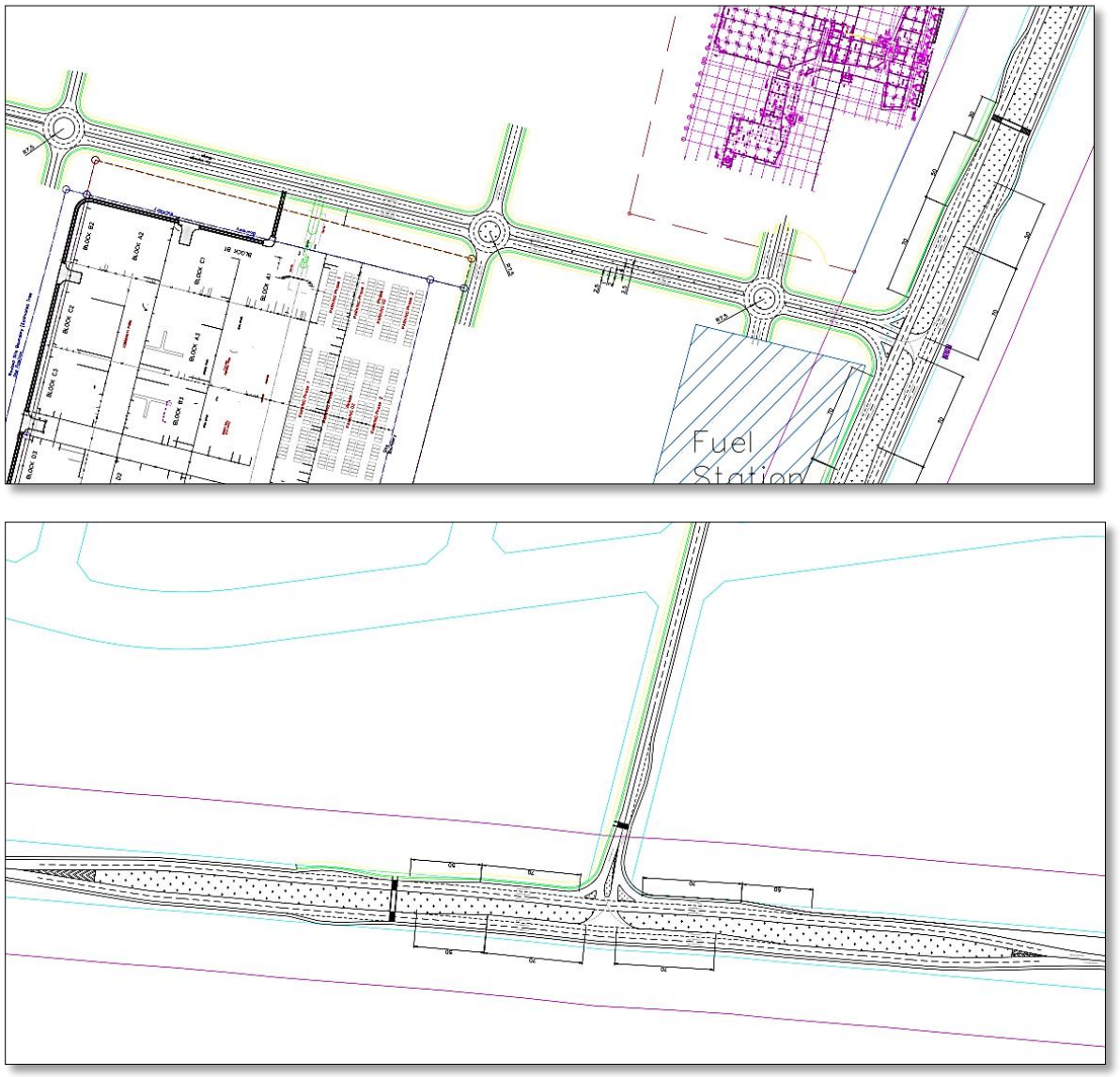
Upon the full completion and operation of the 250-acre Vipingo Industrial Park and a planned expansion of the shopping mall by 2030, the additional proposed medium-term (2030) improvements will include:

(i) Upgrading and dualing of the Mombasa – Malindi (B8) highway;
(ii) U-Turns with deceleration and acceleration lanes provided to allow for safe and seamless merging and diverging of traffic; and,
(iii) Elimination of the Shopping Mall roundabout to accommodate additional traffic and prevent queue overspill onto the highway.

These will require engaging the adjacent stakeholders, the Kenya National Highways Authority and the Kilifi County Government to facilitate this improvement. The proposed improvements are shown in the concept drawings below. The full concept drawings are shown at the end of this report.

Once approved by the Client team, a detailed design of these concepts will be prepared and approved by the relevant road agency/authority before construction can commence.

Short term (2023) layout.



Medium-term (2030) concept layout.

1 INTRODUCTION

1.1 Project Information

The Vipingo Development is on approximately 11,794 acre piece of land along the Mombasa-Malindi (B8) highway in Kilifi County. It is approximately 35km from Mombasa City and 45km from Kilifi town. Figure 1-1 shows the location of the Development.

Figure 1-1: Location of the Vipingo Development

The current phase of the scheme is as follows:

(i) 440 apartments;
(ii) 74 villas;
(iii) A petrol station;
(iv) A shopping mall; and,
(v) An industrial park.

The land uses identified are expected to affect the traffic operating conditions due to the additional generated trips to and from the properties on the development. Due to the number of units within the proposed properties, it is anticipated that there will be improvements required to the road and intersection capacity.

It had previously been identified that the existing access point intersection towards the Vipingo Ridge property was operating at acceptable Levels of Service B and C, and thus would not require capacity improvements. Additionally, the traffic conditions may have changed due to the completion of the Mariakani – Kaloleni – Kilifi (C107) road. Vehicles from the Nairobi – Mombasa (A109) road heading to Kilifi and Malindi along the (B8) highway may be diverted

along this route to circumvent the congestion typically experienced around and within Mombasa City, Miritini, Changamwe, Nyali and Mtwapa areas. This bottlenecks increase journey times and trip costs for through traffic on the way to Kilifi County and beyond.

1.2 Scope of Works

The scope of the Traffic Impact Assessment included:

1. Determination of the prevailing traffic conditions at critical intersections and road sections;
2. Determination of future traffic conditions after the proposed development is complete, using appropriate analytical methods, procedures and manuals such the Highway Capacity Manual (HCM 2016) and the Institute of Transportation Engineers (ITE) Trip Generation Manual 9th Edition and the ITE Parking Generation Manual 4th Edition;
3. Review of on-going and proposed road improvements and plans within the study area; and,
4. Making appropriate recommendations on how the expected traffic impacts due to the development and natural traffic growth can be mitigated.

2 DATA COLLECTION AND ANALYSIS

2.1 Data Collection

The peak period traffic volumes include; Morning peak period (6:00 am – 9:00 am), Midday peak period (12:00am – 2:00pm) and Evening peak period (4:00 pm – 7:00 pm). These were recorded on July 24th, 25th and 28th of July 2020 at the critical traffic census locations 1 and 2, with pedestrian counts at the same locations as shown in Figure 2-1, Figure 2-2 and Figure 2-3 below.

Figure 2-1 Traffic census locations

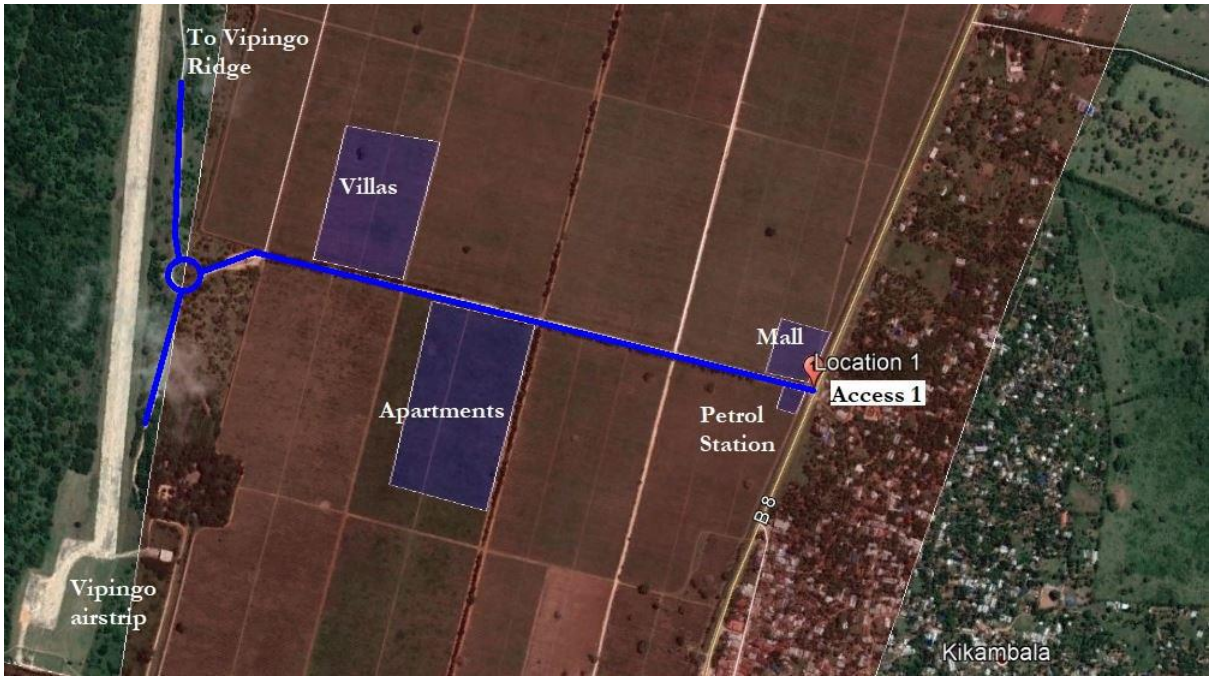


Figure 2-2: Location 1 - Vipingo Ridge access

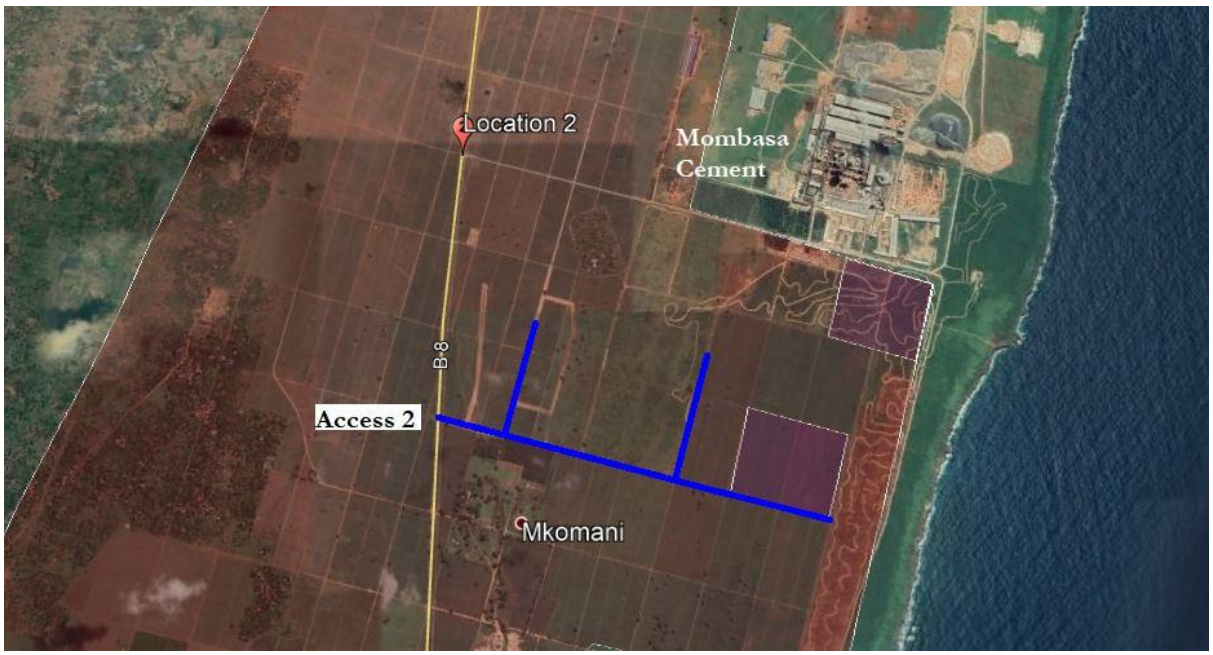


Figure 2-3: Location 2 - Mombasa Cement access

The vehicles were classified under four (4) categories, namely:

1. Cars, pick-ups, 4WDs (personal use);
2. Buses, Minibuses & Vans (Public Service Vehicles);
3. Buses; and,
4. Light Goods, Medium Goods & Heavy Goods Vehicles.

2.2 Analysis Criteria

The traffic data collected was analyzed based on the Highway Capacity Manual (HCM) 2010 guidelines to determine the current levels of service (LOS) and hence the traffic operating conditions.

Six (6) Levels of Service (LOS) are normally defined for each type of facility. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of traffic operating conditions and the driver's perception of those conditions. Detailed descriptions of LOS are given in the box below.

LOS A describes primarily free-flow operations at average travel speeds, usually about 90 percent of the Free Flow Speed (FFS) for the given Road class. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at signalized intersections is minimal.

LOS B describes reasonably unimpeded operations at average travel speeds, usually about 70 percent of the FFS for the Road class. The ability to manoeuvre within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.

LOS C describes stable operations; however, ability to manoeuvre and change lanes in midblock locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both May contribute to lower average travel speeds of about 50 percent of the FFS for the Road class.

LOS D borders on a range in which increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40 percent of FFS.

LOS E is characterized by significant delays and average travel speeds of 33 percent or less of the FFS. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F is characterized by urban road flow at extremely low speeds, typically one- third to one-fourth of the FFS. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

2.2.1 Analysis Criteria for Road Sections

The road section analysis criteria is shown in Tables 2-1 and 2-2 below.

Table 2-1: Road sections (mid-block) analysis criteria

Level of Service	Description	Traffic Volume to Road Capacity Ratio (V/C)
A	Free flow conditions with drivers unaffected by other movements in the traffic streams	<0.65
B	Stable flow with drivers having reasonable freedom to manoeuvre	0.65-0.75
C	Stable flow, but drivers somewhat restricted.	0.75-0.85
D	Approaching stable flow limits with drivers significantly restricted	0.85-0.95
E	Unstable flow, traffic volume at or close to capacity with drivers severely restricted	0.95-1.0
F	Forced flow, traffic volume above capacity limits	>1.0

Table 2-2: Road Lane capacity criteria

Link Type	Road Lane Capacity (passenger cars/hour/lane)
Arterial Road	1,000
Collector Road	800
Local Road	300

2.2.2 Analysis Criteria for Non-Motorized Transport

Pedestrian Volume Counts were carried at the two locations identified. The counts were undertaken for three (3) days over the peak periods on each day. Manual tallying was used and the classifications in Table 2-3 adopted.

Table 2-3: Classification of Non-Motorized Traffic

NMT Category	Description
Pedestrian	Includes people who walk on foot on the road side
Bicycle	Includes human powered/pedal driven two-wheeled vehicles
Human / Animal-drawn cart	Two-wheeled carts drawn by animals or human beings.

The objective of these counts was to determine the pedestrian crossing volumes and characteristics that will inform the design of adequate NMT crossing facilities that enhance safety of NMT.

Table 2-3: Pedestrian analysis criteria

Level of Service	Description	Pedestrian Volume to Capacity Ratio (V/C)
A	Free flow conditions with pedestrians unaffected by other movements	<2.00
B	Stable flow with pedestrians having reasonable freedom to manoeuvre	2.00 – 2.75
C	Stable flow, but pedestrians somewhat restricted.	2.75 – 3.50
D	Approaching stable flow limits with pedestrians significantly restricted	3.50 – 4.25
E	Unstable flow, with pedestrian volume at or close to capacity with pedestrians severely restricted	4.25 – 5.00
F	Forced flow, pedestrian volume above capacity limits	>5.00

3 BASELINE AND FUTURE TRAFFIC CONDITIONS

3.1 Baseline Traffic Conditions

The following traffic challenges are currently experienced on the road network in the neighbourhood of the Development:

1) Risky merging and exiting from the flow of traffic due to high vehicle travel speeds;
2) Deteriorating surface conditions of the surrounding roads;
3) Lack of road markings and missing signage for speed bumps;
4) Traffic conflict points at the Mombasa Cement main access road resulting into minor tailbacks; and,
5) Lack of demarcated and safe pedestrian crossings and bus stops for the local residents and workers.

Given that the proposed development consists of a variety of residential and commercial land uses, this is expected to affect the traffic operating conditions due to the additional daily-generated trips to and from the various areas of the development.

Figure 3-1 below shows the current (2020) traffic operating conditions on the various road sections and intersections.

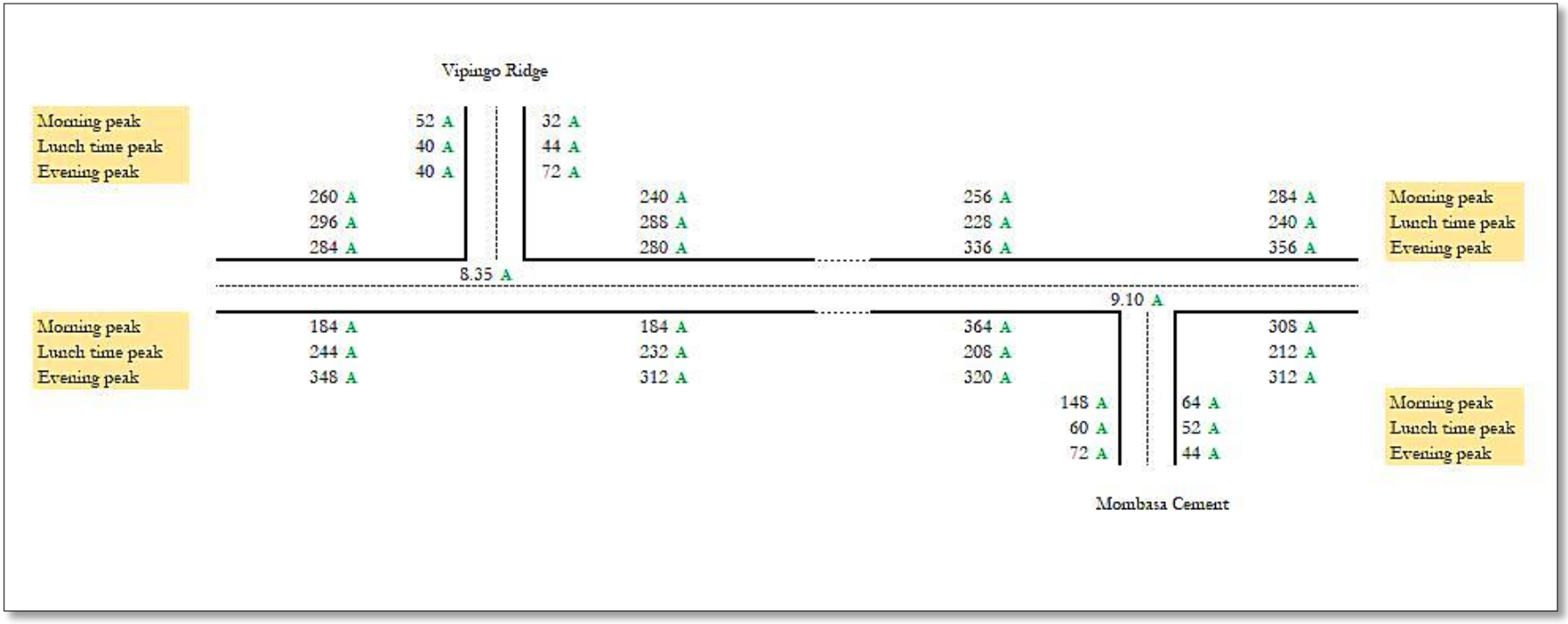


Figure 3-1 Current (2020) traffic operating conditions

From Figure 3-1 above, the following conclusions can be made for the sections where accesses to the property are proposed:

1. Mombasa-Malindi road traffic operating conditions are better than the acceptable LOS C during all peak periods; and,
2. All intersections in the project area have traffic operating conditions better than the acceptable LOS C during all peak periods.

From these results, the traffic operating conditions are acceptable.

3.2 Future Traffic Conditions

3.2.1 The Vipingo Development

The proposed land use as detailed in the Development Plan gives a scheme is as follows:

(i) 440 apartments;
(ii) 74 villas;
(iii) A petrol station;
(iv) A shopping mall; and,
(v) A 250-acre industrial park.

3.2.2 ITE Trip Generation Rates

In this first method, the expected generated/attracted traffic due to the Vipingo Development were computed in accordance with the *ITE Trip Generation Manual 9th Edition*.

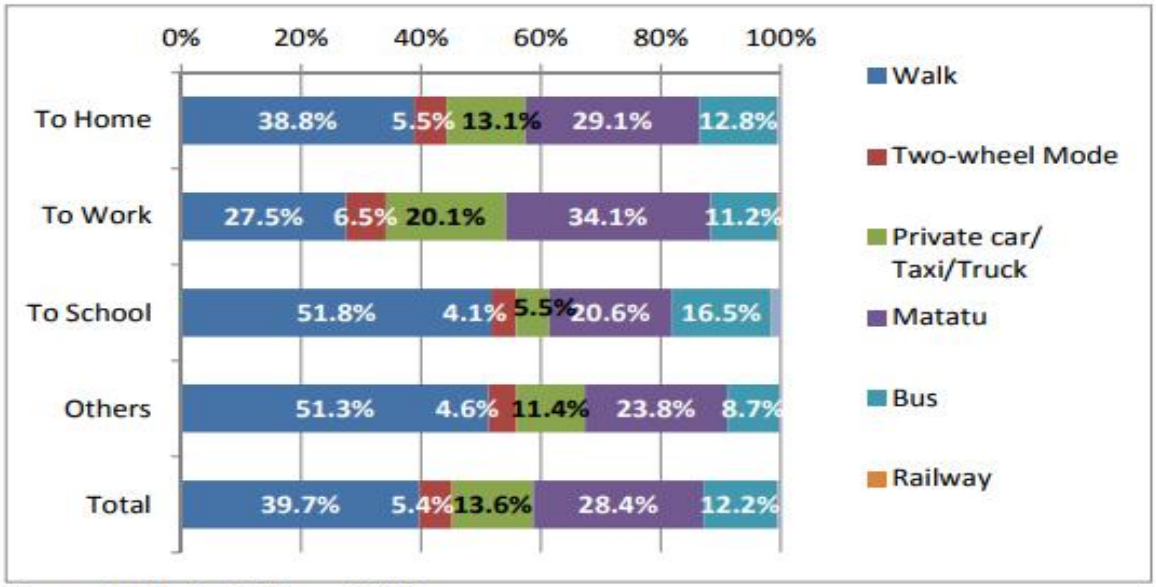
Based on the identified floor area use of the properties, appropriate designations were used from the ITE manual classification that best describe the different units in the proposed development.

Table 3-2 gives a summary of the trips that are likely to be generated by the proposed residential structure. These traffic generation rates are considered conservative as car ownership and usage rates in the sample country (USA) are much higher than in Kenya.

Table 3-1: Trips generated / attracted to the development

	Land use and Code	No. of units	No of daily trips	Generated Trips (Vph)			
				Morning Time Peak Hour		Evening Time Peak Hour	
				In	Out	In	Out
Dwelling Units	Mid-Rise Apartment 223	440	1,848	41	91	100	72
Dwelling Units	Recreational Homes 260	75	237	8	4	8	12
KSF	Shopping Centre 820	108	4,612	42	26	127	138
Stalls	Serv. Stat. w/Conv. Mkt. & Carwash 946	8	1,223	48	46	57	54
Acres	Industrial Park 130	250	15,293	1,702	349	448	1,685

Figure 3-2 below shows the adopted modal split for generated traffic for the various modes and trip purposes.



Source: JICA Study Team (JST)

Figure 3-2: Modal Split of Generated Traffic[1]

It was assumed that for this project area, 45.8% of generated traffic would be non-motorized traffic (NMT) with the remaining 54.2% comprising of motorized traffic (MT). The total traffic was then split between the two modes of traffic as shown in Table 3-3 below.

Table 3-2: Traffic generated from Vipingo Ridge

	AM in	**AM out**	**PM in**	**PM out**
Total traffic (Vph)	140	167	291	275
NMT	45.8%			
	64	77	133	126
MT	54.2%			
	76	**91**	**158**	**149**

Table 3-3: Traffic generated from Industrial Park

	AM in	**AM out**	**PM in**	**PM out**
Total traffic (Vph)	1702	349	448	1685
NMT	45.8%			
	779	160	205	772
MT	54.2%			
	922	**189**	**243**	**913**

[1] The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya

Given that a significant portion of traffic to the property and environs has been identified as non-motorized, provisions must be made to allow for efficient access into the property as well as to allow uninhabited movement of other passers-by. These provisions should include:

1. Pedestrian walkways;
2. Raised "zebra" crossings;
3. Rest areas and shades;
4. Bus stops; and,
5. Street lighting and signage.

3.2.3 Pedestrian Crossing Warrants

Pedestrian crossings are important for accessing developments adjacent to the road. Improperly designed crossing facilities cause discomfort to pedestrians and may jeopardize pedestrian safety as well as create hindrance to smooth vehicular transit traffic flow. Thus, the design of efficient crossing facilities considering the flow of both pedestrians and vehicles is of utmost importance.

3.2.3.1 Projected Peak Hourly Pedestrian Traffic

The pedestrian peak hourly variations were projected to the year 2023 with the adopted growth rates for a scenario without capacity improvements. The results are presented in Table 3-4.

Table 3-4: 2023 Peak Pedestrian LOS without capacity improvements

Road /Link Name	Peds per hr	LOS
Vipingo Ridge	616	F
Mombasa Cement	280	F

3.2.3.2 Proposed NMT Facilities

Based on the analysis and field observations of roadside activities, the current capacity for pedestrian traffic and NMT is inadequate for the morning and evening peak periods, but is sufficient for most periods of the remainder of the day. Therefore, pedestrian facilities will be required at various locations to allow for safer pedestrian crossing.

Adjacent to the PSV drop-off points and bus stops, it is recommended that raised pedestrian crossings should be erected to allow for safe movement as well as to act as traffic calming measures. Guardrails shall also assist in funnelling the pedestrians towards the provided crossings, to minimise conflict with vehicles. Three (3) metre wide footpaths will also allow for acceptable levels of service.

The same measures proposed are recommended at isolated crossings near properties with high pedestrian volumes such as schools or shopping centres, along the Mombasa-Malindi (B8) highway. These will be detailed in Phase 2 of the study.

It is anticipated that pedestrian footbridges will be required to cope with the higher vehicle and pedestrian traffic as the entire Vipingo Development scheme expands.

3.2.4 Future Traffic Scenarios

The total traffic in July 2023 was computed as the sum of generated/attracted traffic from the proposed development and forecasted normal traffic at a growth rate of 6.4%[2] per annum.

The following three (3) future traffic scenarios were considered:

1. Future (2023) traffic conditions **WITHOUT** the development and **WITHOUT** road capacity improvements;
2. Future (2023) traffic conditions **WITH** the development and **WITHOUT** road capacity improvements; and,
3. Future (2023) traffic conditions **WITH** the development and **WITH** road capacity improvements.

3.2.4.1 Scenario 1: Future (2023) traffic conditions WITHOUT the development and WITHOUT road capacity improvements

Figure 3-3 shows the future (2023) traffic conditions for Scenario 1.

[2] GDP Growth rate at 2013- 2017 constant prices

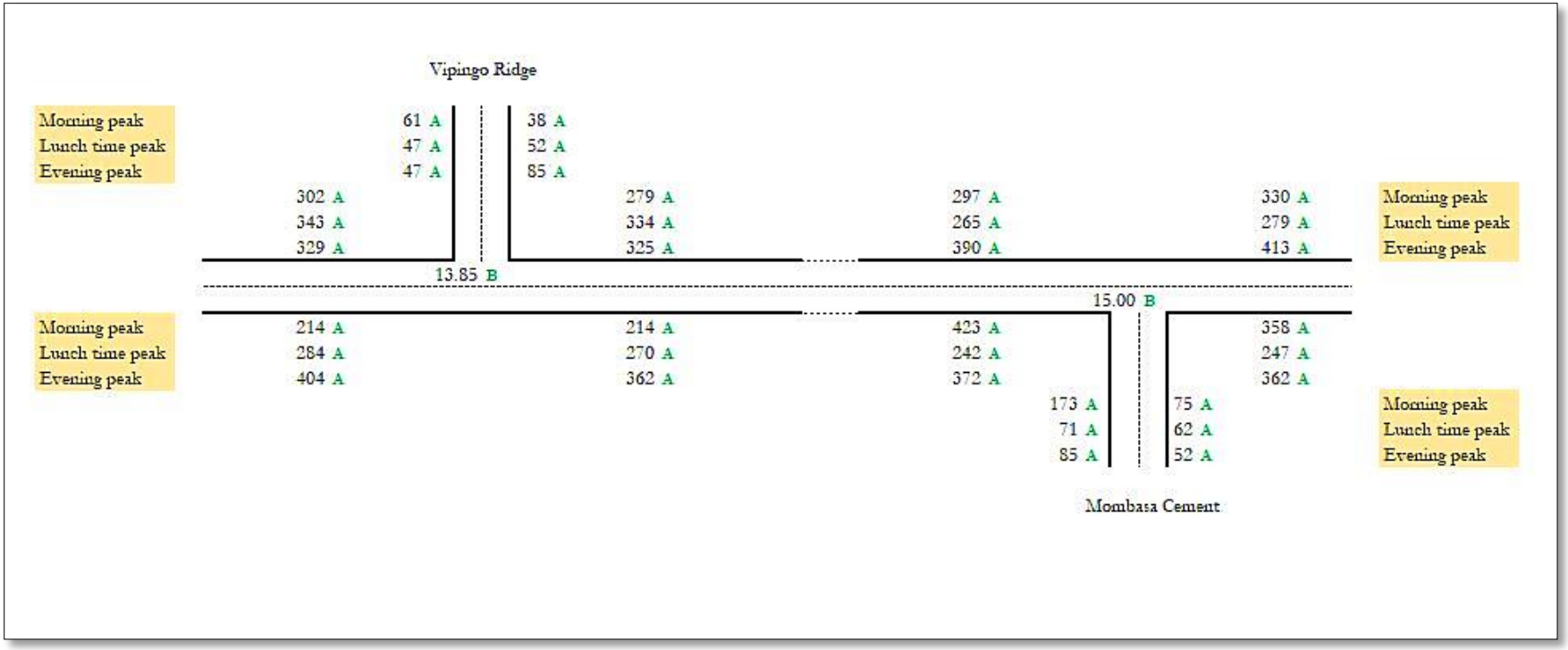


Figure 3-3: Future (2023) road conditions without the development and without improvements.

From Figure 3-3, it can be concluded that with the natural growth of normal traffic there will be marginal increase in traffic volumes, which will maintain the operating conditions of road sections and intersections to better than LOS C. Therefore, road section and intersection capacity improvements will not be required.

3.2.4.2 Scenario 2: Future (2023) traffic conditions WITH the development and WITHOUT road capacity improvements

Based on observed trends of industrial areas established within rural areas, at a conservative rate of 10% per annum, it is anticipated that 30% of the development will be fully operational by 2023. This is due to the time and resources associated with the setup and initialization of plant, machinery and infrastructure associated with the industrial operations expected to occupy the area.
Figure 3-4 below shows the future (2023) traffic conditions with the development but without any road capacity improvements.

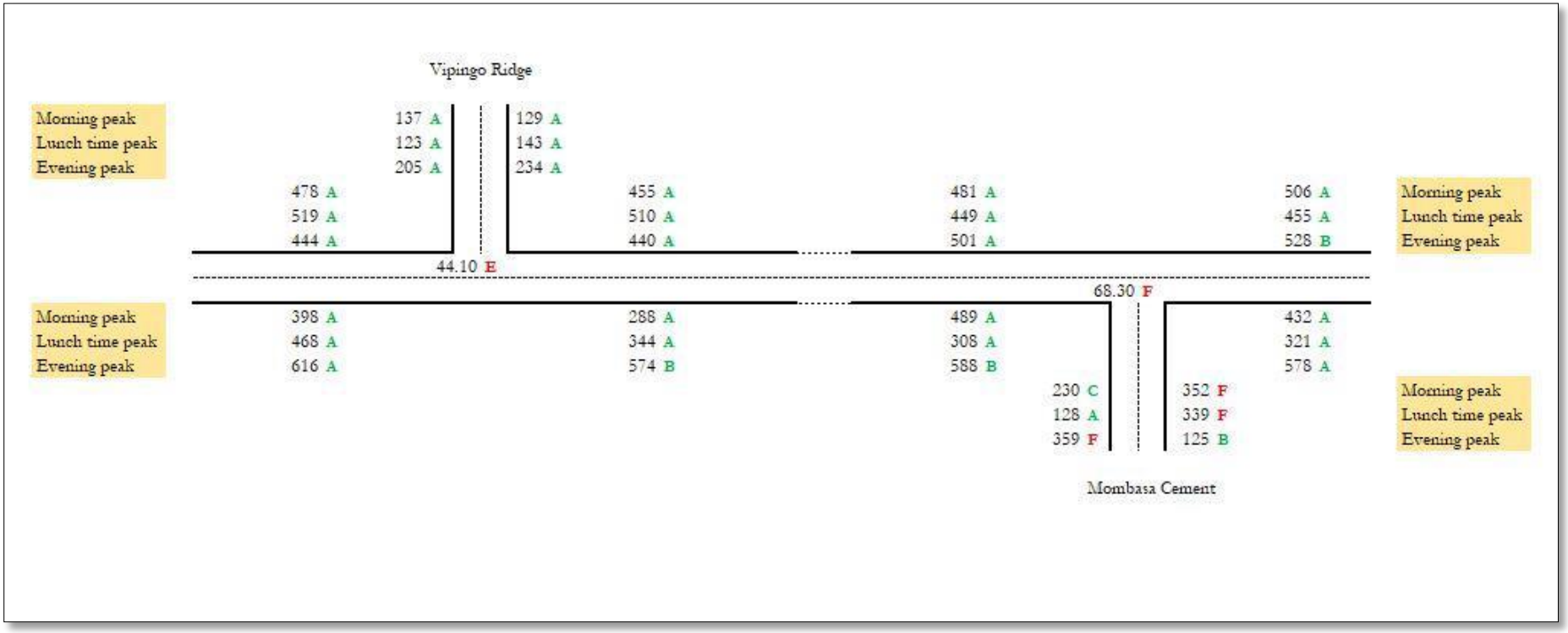


Figure 3-4: Future (2023) road conditions with the development and without improvements

It can be seen from Figure 3-4 that with the completion of the proposed development, without improvements on the nearby existing road network, an LOS poorer than C will be experienced by motorized traffic users at:

(i) Vipingo Ridge intersection,
(ii) Mombasa Cement intersection; and,
(iii) Both directions of the Mombasa Cement access road.

Comparing traffic conditions in Scenario 1 and Scenario 2 leads to the conclusion that the additional traffic from the development will have a negative effect on the Levels of Service on the existing intersections and roads. Capacity improvements will thus be required.

3.2.4.3 Scenario 3: Future (2023) traffic conditions WITH the development and WITH road access improvements

The future (2023) traffic conditions determine that the road sections will require some capacity improvements. The analysis factors in a 30% operational capacity of the industrial park with full operation of the Vipingo residential units, fuel station and shopping mall. The intersections will require improvement to reduce waiting times and queueing for right-turning traffic at the Vipingo Ridge access road and Mombasa Cement access road. This will be necessary to ensure the intersection LOS does not deteriorate further in future.

For part of the pedestrian traffic generated, it is anticipated that majority of Public Service Vehicles inbound to the area will utilize the bus stops designated along the Mombasa-Malindi (B8) highway. Due to the distances involved, it is also anticipated that some of these pedestrian trips may convert to motorcycle (*bodaboda*) rides along the same routes.

The primary proposed improvements include provision and upgrading of pedestrian facilities such as walkways and zebra crossings along the Mombasa – Malindi (B8) highway. A number of the adjacent Kikambala village residents and staff working in the area are anticipated to adopt Non-Motorized Transport (NMT) modes such as walking and cycling in order to access buses and matatus along the highway. PSVs are currently not available directly along the access roads therefore considerable foot traffic is present and will be expected in future.

The proposed improvements include:

(i) Introduction of medians for right turning traffic along the highway at the intersections;
(ii) Deceleration lanes and storage for right turning traffic at both intersections;
(iii) Deceleration lanes for all left turning traffic;
(iv) Upgrading of the Mombasa Cement access road from a Local road to a Collector road;
(v) Roundabouts and junction treatments i.e. islands and medians, along the Vipingo Boulevard;
(vi) Traffic calming provisions, i.e. flat-topped speed humps and rumble strips;
(vii) Pedestrian provisions i.e. signage, walkways and raised crossings;
(viii) PSV provisions i.e. bus stops and laybys; and,
(ix) Street lighting and landscaping.

This proposal takes into consideration the anticipated developments and properties in the vicinity that will generate additional traffic. Therefore, to futureproof the accesses and roadways the geometric design accommodates changes and improvements once traffic increases and the industrial park is at full capacity by 2030.

Figure 3-5 below shows the future (2023) traffic conditions with the developments and with the proposed capacity improvements. Figure 3-6 shows the proposed short-term (2023) layout for the Vipingo Boulevard intersection and Figure 3-7 shows the Mombasa Cement intersection.

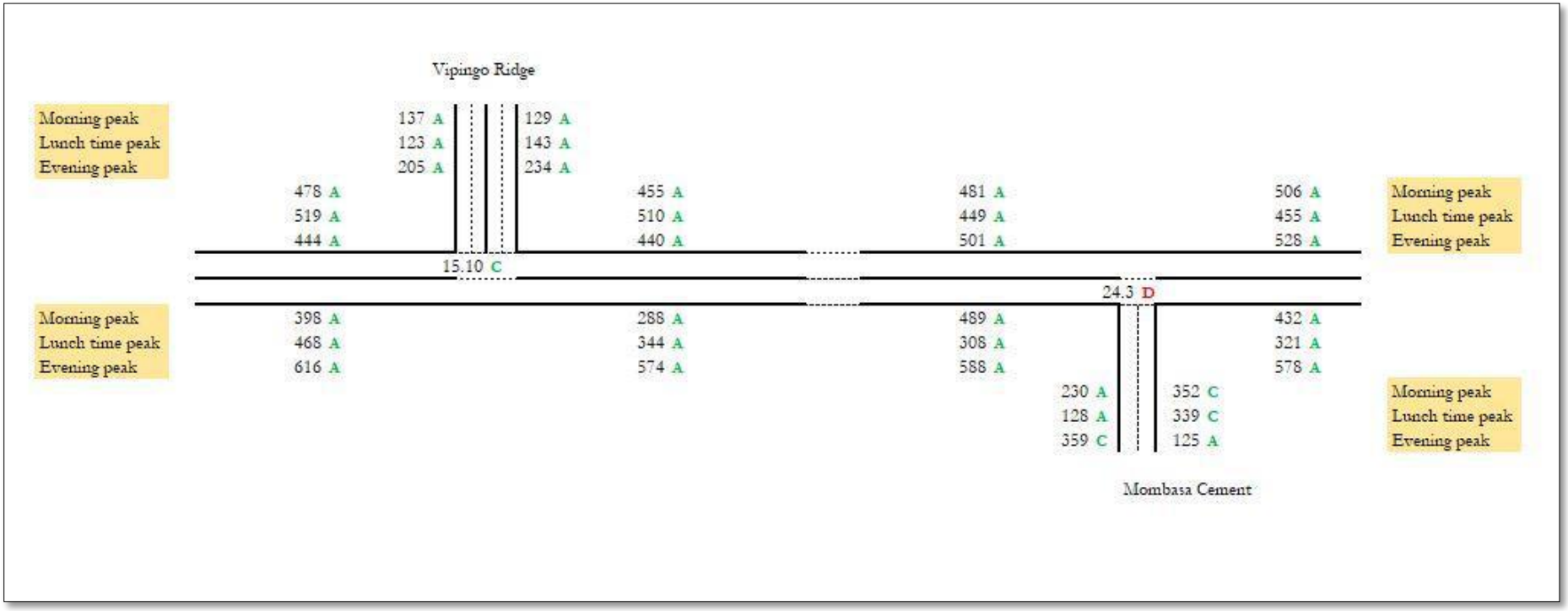


Figure 3-5: Future (2023) traffic conditions with the development and with capacity improvements

Figure 3-6: Vipingo Boulevard concept layout for the short-term (2023)

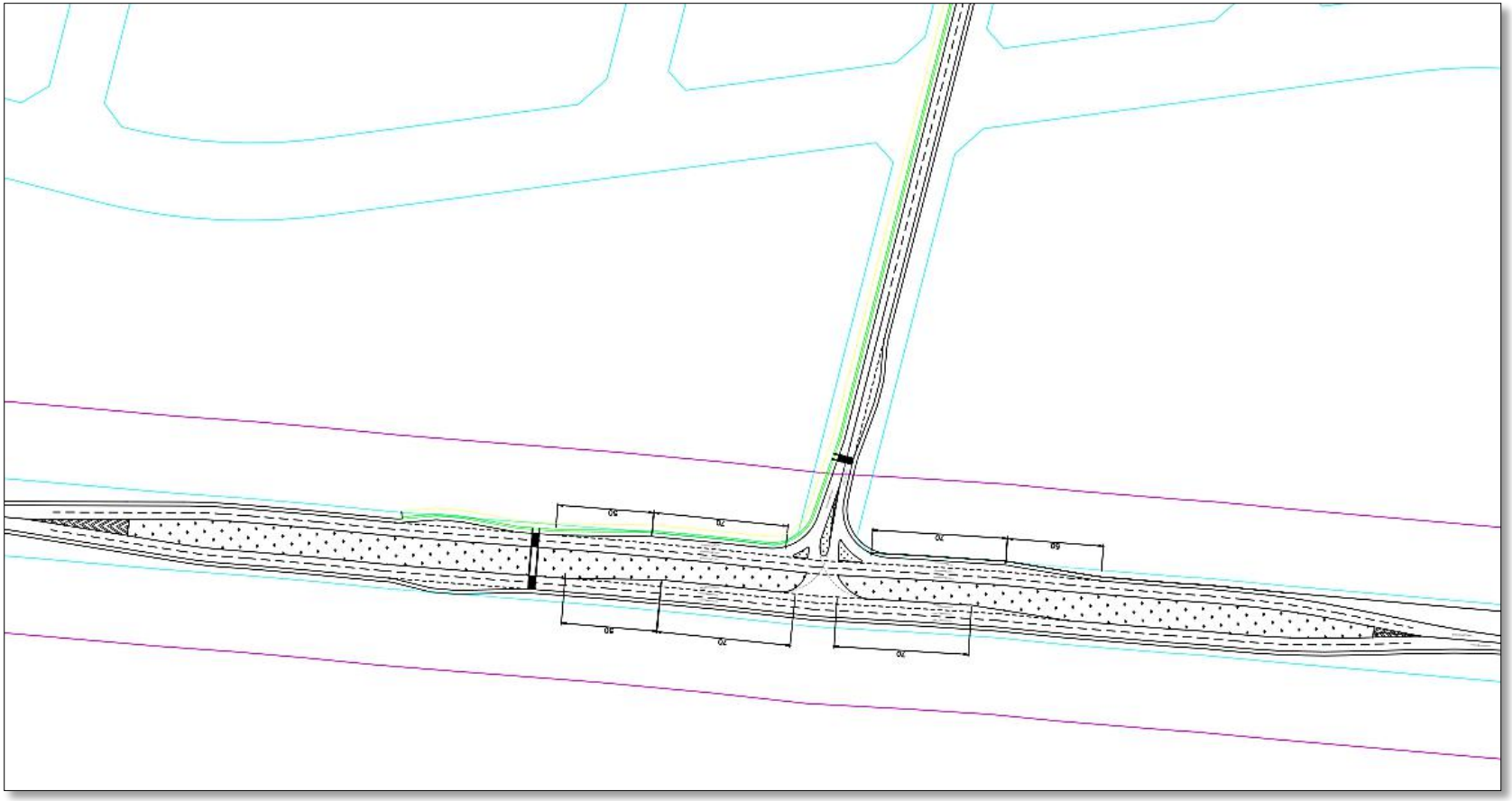


Figure 3-7: Mombasa Cement concept layout for the short-term (2023)

3.2.4.4 Scenario 4: Future (2030) traffic conditions WITH the development and WITH road access improvements

The future (2030) traffic conditions determine that the road sections will require further capacity improvements. This will be due to the completion and operation of the 250-acre Vipingo Industrial Park and a planned expansion of the shopping mall. The intersections will require replacement so as to reduce waiting times and queueing for right-turning traffic at the Vipingo Ridge access road and Mombasa Cement access road which resulted in LOS C and D respectively in the previous (2023) scenario. It is anticipated that the significant volume from the industrial park will necessitate the introduction of U-turns to allow for more seamless merging and diverging of traffic and increase safety aspects of the respective access roads.

The primary proposed improvements for this scenario include:

(i) Upgrading and dualing of the Mombasa – Malindi (B8) highway;
(ii) U-Turns with deceleration and acceleration lanes provided to allow for safe and seamless merging and diverging of traffic;
(iii) Elimination of the Shopping Mall roundabout to accommodate additional traffic and prevent queue overspill onto the highway;

Figure 3-8 shows the future (2030) traffic conditions with the development and with the proposed capacity improvements. Figure 3-9 shows the proposed medium-term (2030) layout for the Vipingo Boulevard intersection and Figure 3-10 shows the Mombasa Cement intersection

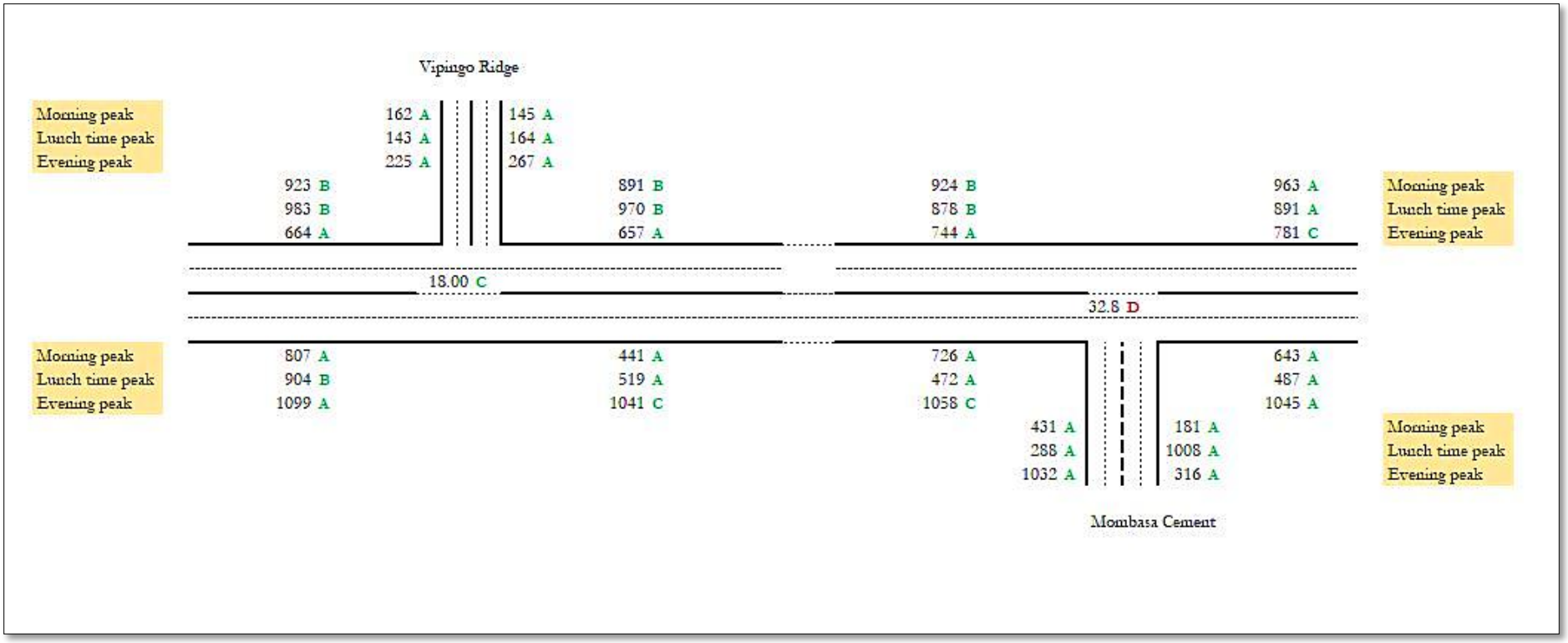


Figure 3-8: Future (2030) traffic conditions with the development and with capacity improvements

Figure 3-9: Vipingo Boulevard concept layout for the medium-term (2030)

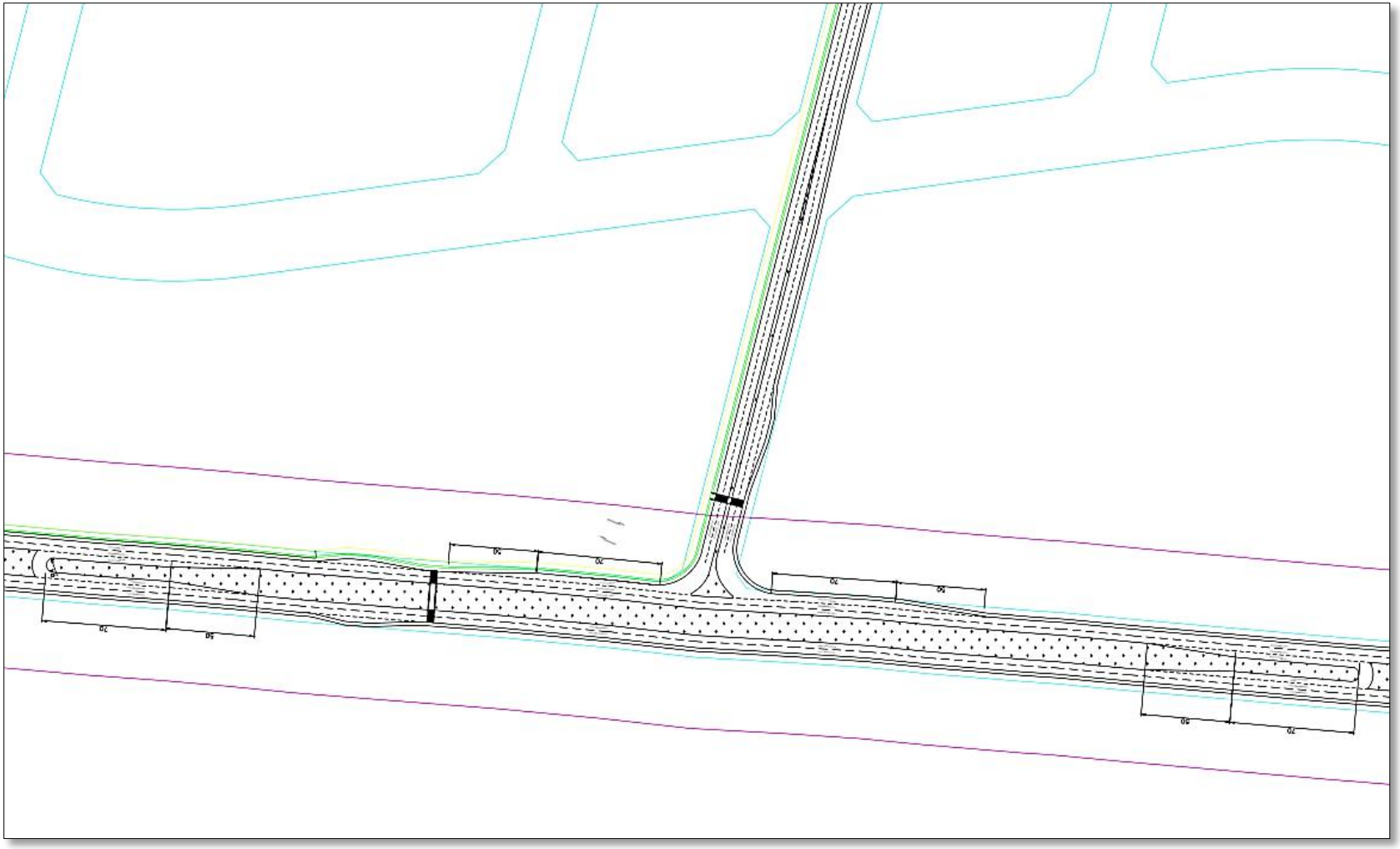


Figure 3-10: Mombasa Cement concept layout for the medium-term (2023)

4 CONCLUSIONS AND RECOMMENDATIONS

Based on the study findings, it was concluded that the road sections within the study area were operating at levels of service better than LOS C in the peak periods during the field surveys in July of 2020. In general, the road sections and intersections therefore, had adequate capacity to handle the existing traffic in all directions during both morning and evening peak periods. However, the current pedestrian volumes, the walkways and crossings are operating at worse than LOS C along both Vipingo and Mombasa Cement access roads within the study area.

In future (2023) with the expected growth of existing traffic without the proposed development, the road sections will generally remain better than acceptable LOS C on the Mombasa-Malindi (B8) highway, Vipingo Ridge access road and Mombasa Cement access road during both peak periods.

In future (2023), upon the completion of construction and start of operations of this phase of the shopping mall, fuel station, villas and apartments, the Vipingo Ridge junction road sections will remain better than Levels of Service C, but the intersection will have an LOS E due to the right turning movements.

As for the Mombasa Cement junction, a good LOS C will be maintained for through traffic once 30% of operations begin at the Industrial Park in 2023. However, the primary access road sections and intersections at the will deteriorate to Levels of Service F during some peak periods. This indicates that the generated traffic due to the proposed industrial park will have a significant adverse effect to the future motorised traffic operating conditions. Capacity improvement will therefore be required for the Mombasa Cement access road and intersection.

Based on the need to upgrade road and intersection capacity and pedestrian mobility, the proposed short-term (2023) improvements include:

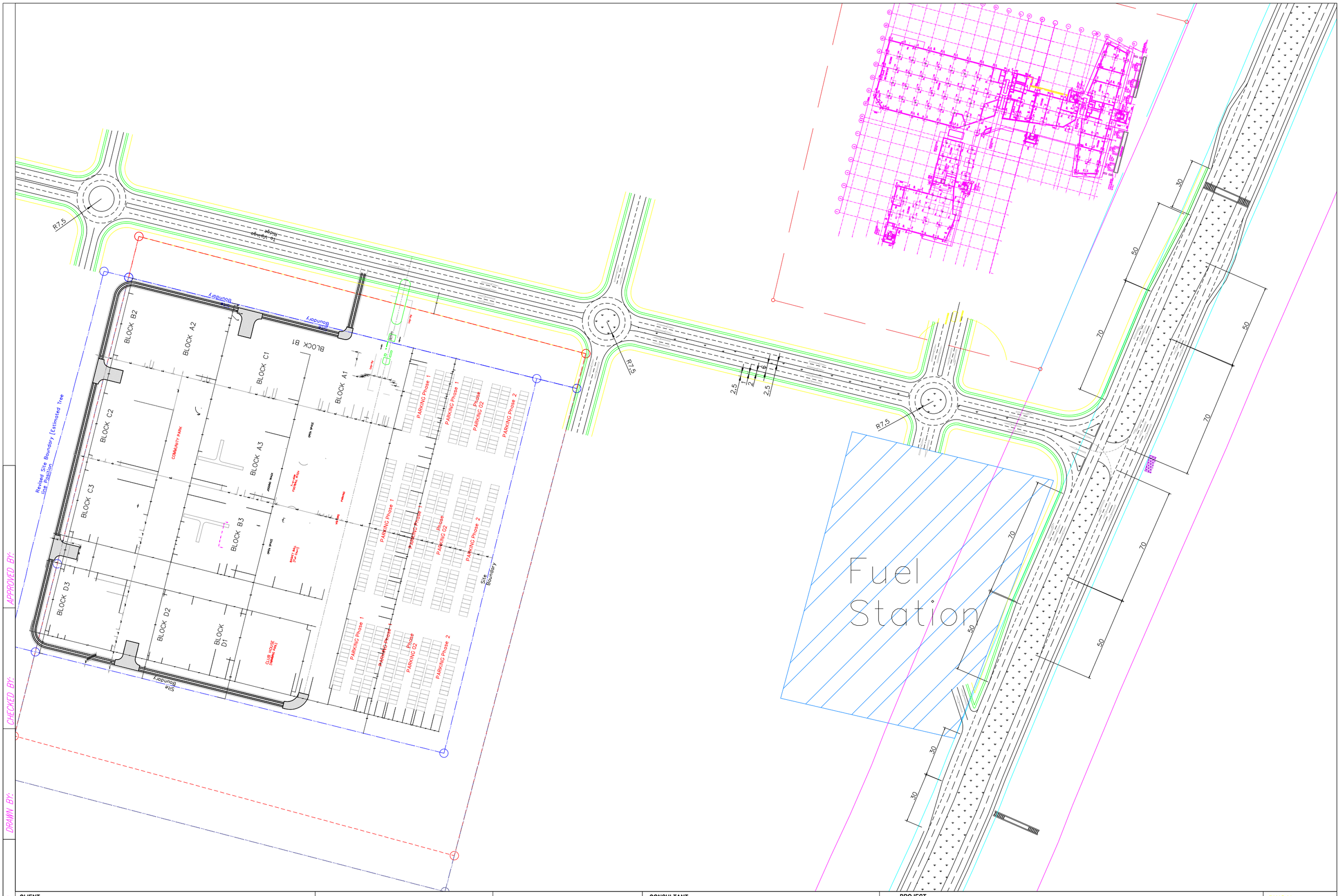
(x) Introduction of medians for right turning traffic along the highway at the intersections;
(xi) Deceleration lanes and storage for right turning traffic at both intersections;
(xii) Deceleration lanes for all left turning traffic;
(i) Upgrading of the Mombasa Cement access road from a Local road to a Collector road;
(ii) Roundabouts and junction treatments i.e. islands and medians, along the Vipingo Boulevard;
(iii) Traffic calming provisions, i.e. flat-topped speed humps and rumble strips;
(iv) Pedestrian provisions i.e. signage, walkways and raised crossings;
(v) PSV provisions i.e. bus stops and laybys; and,
(vi) Street lighting and landscaping.

Upon the full completion and operation of the 250-acre Vipingo Industrial Park and a planned expansion of the shopping mall by 2030, the additional proposed medium-term (2030) improvements will include:

(i) Upgrading and dualing of the Mombasa – Malindi (B8) highway;
(ii) U-Turns with deceleration and acceleration lanes provided to allow for safe and seamless merging and diverging of traffic; and,

(iii) Elimination of the Shopping Mall roundabout to accommodate additional traffic and prevent queue overspill onto the highway.

A detailed design of this approved concept will be prepared and approved by the relevant road agency (KeNHA) and the local authority (the Kilifi County Government) before construction can commence.



APPROVED BY:

CHECKED BY:

DRAWN BY:

DESIGNED BY:

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PROJECT MANAGER
(VIPINGO DEVELOPMENT) :

REVISIONS	
DESCRIPTION	DATE

CONSULTANT

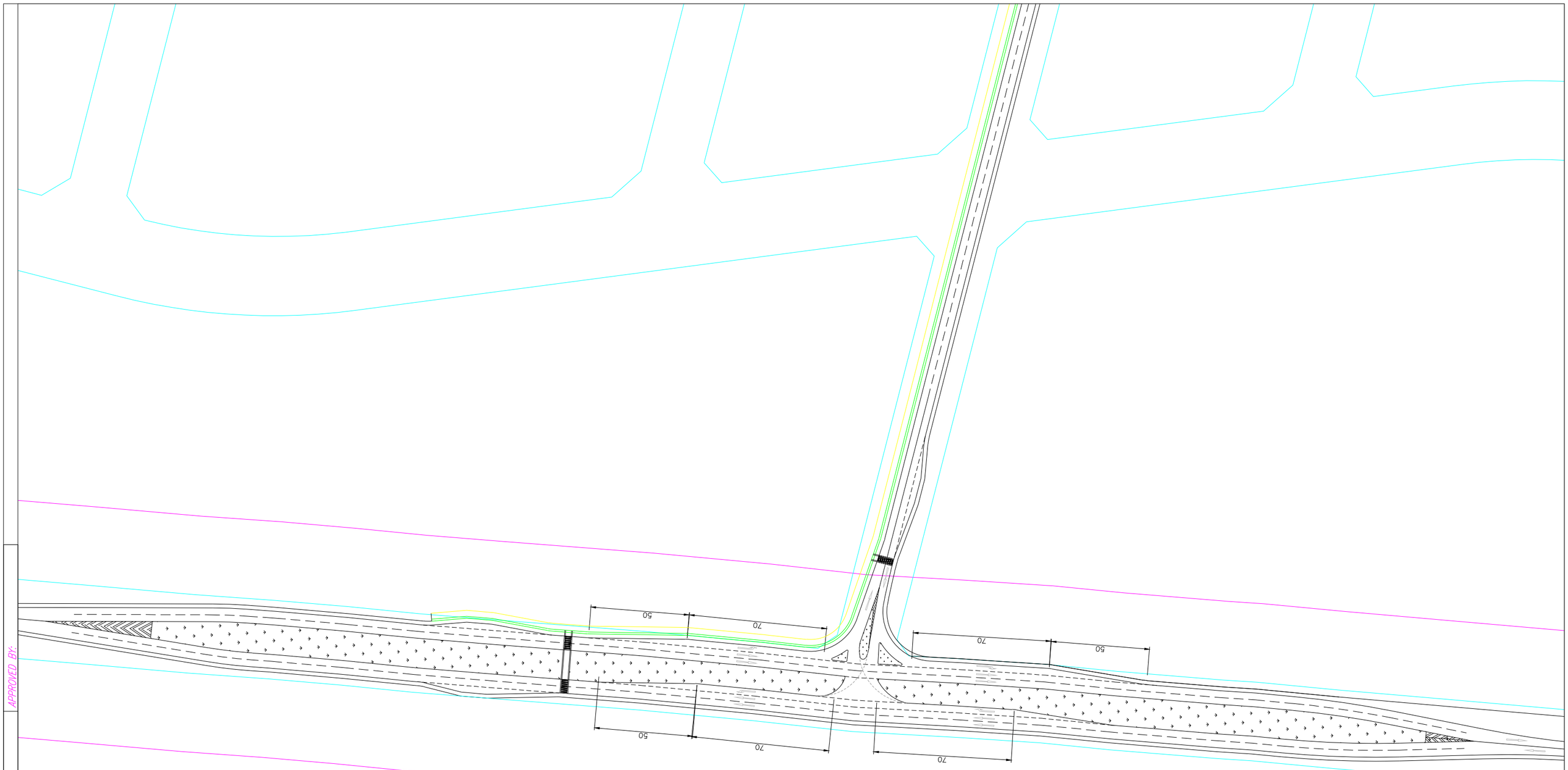
ITEC Engineering Ltd.
Infrastructure, Transportation & Environment
Consulting Engineers

PROJECT

VIPINGO DEVELOPMENT

CONCEPT LAYOUTS

DWG No : ITEC/VD/1
SHEET : 1 of 4
SCALE : 1:1000
DATE: AUG 2020



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CONCEPT LAYOUTS

DWG No : ITEC/VD/1

SHEET : 2 of 4

SCALE : 1:1000

DATE: AUG 2020

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Shopping Mall

Drop-off Zone

Fuel Station

BLOCK A2
BLOCK B1
BLOCK C1
BLOCK A1
BLOCK A3
BLOCK B3
BLOCK D1
COMMUNITY PARK
CLUB HOUSE
PARKING Phase 1
PARKING Phase 2
PARKING 02
Site Boundary
Boundary
To Vipingo Ridge
R7.5
R4
90
70
50
30
28
6
2
2.5

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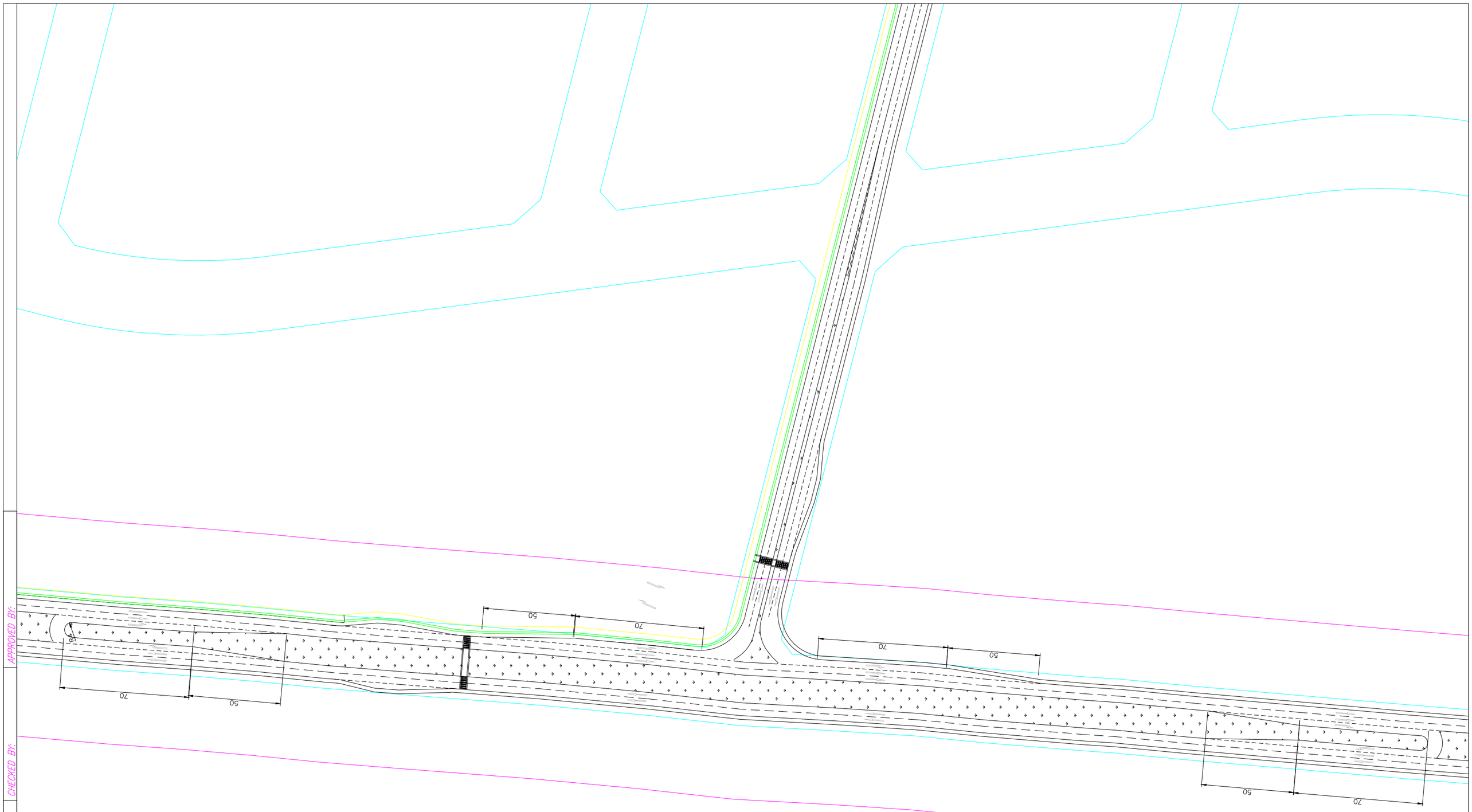
DWG No : ITEC/VD/1
SHEET : 3 of 4
SCALE : 1:1000
DATE: AUG 2020



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CONCEPT LAYOUTS

DWG No : ITEC/VD/1

SHEET : 4 of 4

SCALE : 1:1000

DATE: AUG 2020