

GHANA INFRASTRUCTURE CONFERENCE 2020

VIRTUAL EDITION

**AUG
11-14**

Theme: Planning and Implementation of Sustainable Transportation Infrastructure

GIC-2020
#KeepGhanaMoving

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Info Pack

Organizers



Regional Transport Research &
Education Centre Kumasi-TRECK
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Partnering with the following ministries



Ministry of Aviation
Ministry of Transport
Ministry of Roads and Highways
Ministry of Railways Development

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INTRODUCTION

GIC-2020
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Intro Message

GIC 2020 Virtual Edition

Intro Message

On behalf of the 2020 Ghana Infrastructure Conference (GIC-2020) Planning Committee, we are pleased to welcome you to this momentous virtual conference on **Planning and Implementation of Sustainable Transportation Infrastructure**. This event is co-sponsored by the Ghana Transportation Professionals Forum of North America, the Ghana Institution of Engineering, and the Regional Transportation Research & Education Center Kumasi. Due to COVID-19 restrictions, this conference is being conducted virtually from August 11th to August 14th. Though many of you enjoyed our physical gathering at the Accra Holiday Inn during the 2018 Ghana Infrastructure Conference (GIC-2018), participants' health and safety are paramount as we fight the novel coronavirus threat.

While we are disappointed that we will not be able to meet and interact with you in person, we still have a great program planned, with the breadth and quality of content participants enjoyed during GIC-2018 in Accra. Through the Zoom platform, our professional and experienced presenters will engage with you in a series of open and constructive dialogues covering the spectrum of sustainable transportation infrastructure development. While the current pandemic has stymied our way of life, this online platform grants us the ability to connect from anywhere in the world. It is our hope that you will fully participate in the conference, and learn about practical ways of advancing transportation for Ghana's economic development.

Together we can **#KeepGhanaMoving – “Forwards Ever; Backwards Never.”**

Thank you.
Sincerely,

Conference Co-Chairs

GIC-2020 Planning Committee

Yolanda Oliver-Commey, PE, PTOE, MGhIE
Samuel Owusu Ababio, PhD, PE, MASCE
Samuel Labi, PhD, MASCE

What is GIC-2020

Following its maiden transportation focused Ghana Infrastructure conference in August 2018 (GIC-2018), the Ghana Transportation Professionals Forum (GTPF) in collaboration with the Ghana Institution of Engineering (GhIE) and the Regional Transport Research and Education Centre, Kumasi (TRECK) of the Kwame Nkrumah University of Science and Technology (KNUST), is organizing Ghana Infrastructure Conference 2020 (GIC-2020) with the theme Planning and Implementation of Sustainable Transportation Infrastructure. In line with current global concerns, the conference also aims to bring together professionals to discuss infrastructure and its relationship and effects of the pandemic.

The safety of our participants is important to us. As such, after careful consideration and consultation with our partners regarding travel restrictions and crowd-size constraints due to COVID-19, the organizers of the conference decided to postpone the in-person version of the conference to 2021 and to hold a streamlined 2020 version online.

Objectives of GIC 2020

The Ghana Infrastructure Conference 2020 (GIC 2020) aims to accomplish the following:

Create a platform where consultants, agencies, policy makers, and researchers network, deliberate and collaborate to advance sustainable and innovative solutions for transportation related and general infrastructure issues.

Create an environment that helps to inspire and influence the current workforce and the upcoming generation.

Foster and provide a conducive mechanism for practical and technical knowledge transfer.

Build capacity of and collaboration among diverse professional groups, private and public agencies, and academic institutions to develop and implement national infrastructure policies and plans.



DAILY PROGRAMS

GIC-2020

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DAY 1: Tuesday | 8/11/2020

Moderator: Ing. Kwabena Agyepong

Rapporteur: Eugene Antwi Boasiako

DAY 1	Tuesday 8/11/2020	Presenter
2:30-2:45 PM (GMT) 10:30 -10:45 AM (EST)	Intro Session / Remarks	Conference Chair- Planning Committee
2:45 – 3:00 PM (GMT) 10:45 -11:00 AM (EST)	Railway Development: Status and Updates of The Railway Masterplan	Hon. Joe Gharthey – Minister of Railways Development
3:00 -3:15 PM (GMT) 11:00 -11:15 AM (EST)	Sea Port Development Landscape of Ghana	Ing. Komla Ofori- Ghana Ports and Harbours Authority (GPHA)
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Q&A	
3:30 - 3:45 PM (GMT) 11:30 -11:45 AM (EST)	Pokuase Interchange	Ing. Kwabena Bempong - Associated Consultants Ltd
3:45 – 4:00 PM (GMT) 11:45 AM -12:00 PM (EST)	Tema Interchange: Design and Construction	Ing. Collins Donkor – Ghana Highway Authority
4 - 5PM (GMT) 12:00 -1:00 PM (EST)	A Framework for Standardization and Integration of Design Practices for Road Infrastructure	Prof. Samuel Owusu-Ababio
	<u>Lightning Presentation:</u> White Paper Series / Technical Committees	Dr. Dan Seedah/ Dr. Julius Codjoe
	Q&A and Roundup	

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Regional Transport Research & Education Centre Kumasi-TRECK
KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY



DAY 2: Wednesday | 8/12/2020

Moderator: Ing. Magnus Quarshie
Rapporteur: Stephanie Adams

DAY 2	Wednesday 8/12/2020	Presenter
2:30-2:45 PM (GMT) 10:30 -10:45 AM (EST)	The Impact of COVID- 19 lock-down on Mobility and environment	Ing. Prof. Rev. Charles Adams and Gift Dumedah
2:45 – 3:00 PM (GMT) 10:45 -11:00 AM (EST)	The Design, Fabrication & Testing of Infrared Traffic Counter on Selected Major Dual-Carriageways in Akure-Nigeria	Samuel Ajayi/ Dr. Busari Ayobami
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Earthquake Considerations for Infrastructure Delivery	Ing. (Mrs.) Carlien Bou-Che-did
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Q&A	
3:30 - 3:45 PM (GMT) 11:30 -11:45 AM (EST)	Accra Traffic Management Center (TMC) – Status and Updates	Ing. Amoo-Gottfried / Ing. Pat Onny
3:45 – 4:00 PM (GMT) 11:45 AM -12:00 PM (EST)	Innovative Intermodal Transport Option to Reduce Congestion Along Coastal Highway Corridors in Ghana	Samuel Ampomah et al
4 - 5PM (GMT) 12:00 -1:00 PM (EST)	Student Community Engagement <u>Lightning Presentations:</u> White Paper Series / Technical Committees Q&A and Roundup	Prof. Sam Owusu-Ababio Dr. Dan Seedah / Dr. Julius Codjoe

Join Zoom Meeting

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Passcode: 124324

DAY 3: Thursday | 8/13/2020

Moderator: Dr. Felix Ammah-Tagoe
Rapporteur: Hilda Ofori-Addo

DAY 3	Thursday 8/13/2020	Presenter
2:30-2:45 PM (GMT) 10:30 -10:45 AM (EST)	The COVID 19 Pandemic social Distancing in Public Transport and its impact of Safety Security and Operational Sustainability	Ing. Prof. Rev. Charles Adams, Kwame Kwakwa Osei and Gift Dumedah
2:45 – 3:00 PM (GMT) 10:45 -11:00 AM (EST)	Macroscopic Safety Models for Hot Zone Identification	Dr. Richard Amoh-Gyimah et al
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Seatbelt Use Among Vehicle Occupants in Accra Area, Ghana	Simon Ntramah et al
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Q&A	
3:30 - 3:45 PM (GMT) 11:30 -11:45 AM (EST)	Road Traffic Data: Overview and Recommendations for Collection Methods and Applications in Ghana	Ing. Dr. (Mrs.) Abena Obiri-Yeboah et al
3:45 – 4:00 PM (GMT) 11:45 AM -12:00 PM (EST)	Advancing Development of a Transportation Data Hub	Dr. Dan Seedah
4 - 5PM (GMT) 12:00 -1:00 PM (EST)	<u>Lightning Presentation:</u> A Primer to A National Infrastructure Dialog Q&A and Roundup	Prof. Cornelius Nuworsoo

Join Zoom Meeting

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Meeting ID: 852 8199 0400

Passcode: 124324

DAY 4: Friday| 8/14/2020

Moderator: Ing. Charles Adams

Rapporteur: Richard Dzinyela

DAY 4	Friday 8/14/2020	Presenter
2:30-2:45 PM (GMT) 10:30 -10:45 AM (EST)	Kotoka International Airport Project Updates	Ing. Leslie Alex Ayeh- Presi- dent GhIE
2:45 – 3:00 PM (GMT) 10:45 -11:00 AM (EST)	Africa Catalyst Project Phase 3 (ACP3)	Royal Academy of Engi- neering RAF/GCRF/ACP3
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Impact of Urban Transport on Poverty, Economic, And Environ- mental Outcomes Within GAMA	Ing. Magnus Lincoln Quarshie et al
3:15-3:30 PM (GMT) 11:15 -11:30 AM (EST)	Digging Our Way out of Corrup- tion: Is it Feasible? The Role of Ethics	Ing. Hector Boye/ Prof. Sam Owusu-Ababio
3:30 - 5PM (GMT) 11:30 -1:00 PM (EST)	Q&A <u>Lightning Presentation:</u> White Paper Series / Technical Committees Organizing Partner Remarks Conference Survey Conference Closing Remarks	Dr. Dan Seedah Dr Margaret-Avis Akofio-Sowah

Join Zoom Meeting

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PARTICIPANT GUIDELINES

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1. Pre-requisites:

- Connection devices:

You will need a laptop or a mobile device with a working speaker or headphones and a microphone.

- High speed internet:

For the best experience, you need a high-speed internet preferably cable network or 4G data when using ZOOM meeting mobile application.

- Google Chrome:

ZOOM meeting is best accessed via Google Chrome browser as it is well-integrated to give you best experience.

- ZOOM meeting Application:

Download ZOOM meeting on your Mac, Windows, or Linux PC from the link:
<https://www.zoom.com>

You can also download the ZOOM meeting App on your mobile device from the App Store, Google Play, or Windows Phone Store



2. Joining ZOOM meeting

1. During this meeting, all participants' microphones will be muted except during the second part of the Q&A session where the Moderator opens up the floor for direct questions from the audience.
2. To ask a question during the presentation, kindly (a) type the question in the Chat Box feature of Zoom. The Q&A activity consists of two parts. In the first part, the Moderator reads aloud the questions from the chat box. In the second part of the Q&A, the Moderator opens the floor for you to ask a question using your audio. To ask a question during the second part, click the "Raise Hand" feature. The second part will happen only if there is adequate time. The speaker will address as many questions as time will allow. Towards the end of the day's events, there will be time allocated for the audience to ask additional questions.
3. Please keep your questions short and concise.
4. Should you encounter any technical problems during the session, kindly indicate in the chat column, and our technical team would assist you.



3. Testing ZOOM meeting

ZOOM will be open an hour to the start of the session to enable all participants test the connections, however prior tests can be done upon request. It is highly recommended that tests be carried out to enable those using the virtual connection for the first time get any prior help

4. ZOOM meeting session

During the meeting, we request all the attendees to mute their microphones to enable all the meeting attendants follow the meeting smoothly. You will only unmute yourself when taking the floor.

1. Chat facility is available to everyone and you can make requests to take the floor by sending a direct message to the meeting administrator who will then inform the chair of your intention to take the floor.
2. You may also “raise your hand” by clicking the participants icon at the bottom of the screen and subsequently clicking the “ellipsis or three dots” icon at the far right and selecting the raised hand.





PRESENTATION ABSTRACTS

GIC-2020

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1-1 Railway Development: Status And Updates Of The Railway Master-plan

Hon. Joe Charthey

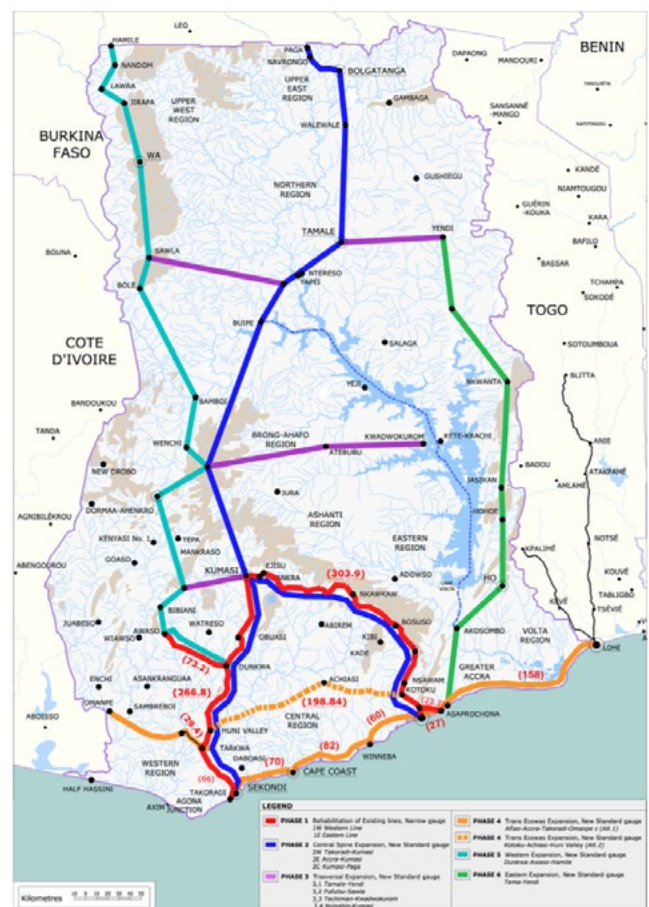
Minister, Ministry of Railways Development, Ghana

ABSTRACT

President Akufo-Addo in May 2017 named Honorable Joe Charthey as pioneering minister of the Ministry of Railways Development. The Ministry is developing a modern, national railway network to support Ghana's economic development. The goal is to link the main population centers within the country with major ports and harbors; economic areas for food production, timber and mineral extraction, and manufacture of goods; and neighboring countries. The plan for Ghana's railways development identified the implementation of 1,394 km of rail network as Priority Projects to create jobs and facilitate trade and industrial development. This, in turn, is to stimulate economic growth, develop new towns and cities, and revitalize older towns. This railway project is also intended to reduce traffic loads on the road network which will help extend trunk road lifespans.

The development of the railways sector is to ultimately catalyze complete transformation of the national economy. There are unlimited opportunities for the private sector in the development of the railway network and ancillary activities. The project encourages private-sector collaboration in all rail development aspects. The cost estimate for the full, standard-gauge national network development of 3,781 route-km is \$23 billion, and that for the 1,394 route-km of priority railway network is \$7.8 billion. A notable route under construction is from Accra to Ouagadougou linking the Port of Tema with an inland port at Mpakadan near Akosombo northwards towards Burkina Faso. The Government of Ghana is developing the first 97 km and the remaining 700 km (to Paga) will be developed on a public-private partnership basis. The Governments of Ghana and Burkina Faso have reached the final stages of selecting a private-sector investor to partner with the two governments to develop the 1000 km line from Tema, Ghana to Ouagadougou, Burkina Faso.

KEYWORDS: Railway, Economic development, Public-private partnership, Ghana.



1-2 The Landscape Of Port Development In Ghana

Ofori, K¹

1. Project Engineer, Coastal Ports Development at GPHA, Tema, Ghana, kofori@ghanaports.gov.gh

ABSTRACT

This presentation introduces the port development industry in Ghana. It starts with a description of the port inventory in the country. Then the presentation discusses the various classifications of ports, legal backing for port development and operations, and the socio-economic importance of the interlinking services clusters, infrastructure, and other sectors of port development. The presentation also discusses the port development programs that were initiated circa 2012, and the state of development until now. During the presentation, mention will be made of the Ports of Tema and Takoradi. Also, new ports and current visions of port development at Keta and at other current and potential areas for fishing ports and landing sites, inland ports and the lake ports, will be discussed. The presentation will also discuss the strategic development the country's system of ports, including the Master Ports Planning and Development initiative, and the opportunities associated with port development in the country. Mention will be made of the effects of the current Covid19 on the port development industry, with a few examples. The presentation will lend with an emphasis on the need for home-grown initiatives to sustain the port development agenda, to ensure a crisis-resilient future.

KEYWORDS: Ports, harbors, Tema, Takoradi, Keta.



1-3 Design And Construction Of The Pokuase Interchange And Local Roads- Planning And Construction Update

Bempong, K.¹

Ansu-Gyamfi, K.²

1. *Vice President- Business Development, Associated Consultants Ltd, Accra, Ghana*
2. *Senior Highway Consultant, Associated Consultants Ltd, Accra, Ghana*

The Government of the Republic of Ghana is implementing the construction of the Pokuase Interchange and Local Roads project under the Accra Urban Transport Project, financed by the Government of the Republic of Ghana and the African Development Bank.

The project was designed exclusively by local engineers of Associated Consultants Limited (ACON), Ghana and it is being supervised jointly by ACON and Bigen Group of South Africa. The Contractor is Zhongmei Engineering Group from China.

The project is located at the north-western corridor of the Greater Accra Metropolitan Area situated within the Ga West and Ga North Municipal Assemblies. The Interchange is being constructed at the junction of the Nsawam Road (N6) and the Awoshie-Kwabanya Roads. The project involves the construction of a 4-Tier stack Interchange and approach roads. Of significance is the provision of other complimentary social services such as local roads, free health screening and environmental improvement. It must be mentioned that the provision of infrastructure as a catalyst for livelihood improvement within surrounding communities of the project catchment area is a major policy of the African Development Bank and the Pokuase project is an example of the successful implementation of this policy. The implementation of this project required some innovative solutions to specific challenges which involved reconfiguration of the Interchange bridges through Value Engineering initiated by the contractor. The lessons learnt are shared in this paper.

The lessons that are presented in this paper potentially carry broad international relevance, because many large-scale infrastructure works face distinct challenges which are usually not reported. Success or otherwise of large projects require considerable stakeholder management and consultations. This project has brought to the fore the need to always think through issues and to provide various solutions which can be analyzed and the best ones chosen after broad consultation. The presentation includes an update of progress made to date and the challenges for future project implementation are discussed.

KEYWORDS: Pokuase, Interchange, Construction, N6.



1-4 Tema Interchange: Design And Construction

Donkor, C.¹

1. Director, Contracts Division, Ghana Highways Authority, Accra, Ghana. donkorcollins@yahoo.com

ABSTRACT

Background: Over the past decades consistent traffic congestion has affected productivity and economic activities in the Republic of Ghana, and the Tema Metropolis being an industrial hub has not been spared. It is in this regard that the Government of Ghana made a request to the Government of Japan for assistance to improve upon the Tema Motorway Roundabout under the Grant Aid Scheme. The entire project scope is to change the Tema Motorway Roundabout into a Tree-Tier Intersection.

Location: The Tema Motorway Intersection is located in the Urban City of Tema. It connects the National Road 1 (N1) which is part of the ECOWAS Highway and the National Road 2 (N2) which heads to the East Inland Countries.

Project Implementation: The Survey and Design for the Project begun in May 2015 and was completed in August 2017. The Project was divided into two phases during the Detailed Design Phase. Phase 1 is a two tier intersection with a depressed section (underpass), also in the form of a Tunnel in the East-West direction. Phase Two (2) of the Project which will be an elevated bridge is expected to begin soon and would then carry traffic in the North – South direction with only left turning vehicles now being the ones to use the Signalized Intersection at the second level. Total improved Road Lengths under Phase 1 are approximately 4,000m, 2100m in the East-West Direction and 1900m in the North-South Direction. The length of the Box Culvert (Underpass) is 190m. The Project also includes the construction of four (4) Pedestrian Bridges, one on each approach to the intersection. Construction works for Phase 1 begun in February 2018, Sod-Cutting done in July 2018 and was fully opened to traffic on 16th May 2020. Commissioning was done by His-Excellency the President of the Republic of Ghana, Nana Addo Dankwa Akufo-Addo on 5th June, 2020. Funding for the Project was a Grant from the Government and People of Japan through the Japanese International Cooperation Agency (JICA). It was undertaken under the umbrella of the Ministry of Roads and Highways with Ghana Highway Authority as the implementing agency.

KEYWORDS: Tema, Interchange, Construction.

1-5 A Framework For Standardization And Integration Of Design Practices For Road Infrastructure

Sam Owusu-Ababio P.E., Professor., Dept. of Civil and Environmental Engineering., Univ. of Wisc., Platteville, WI 53818, owusu@uwplatt.edu

In his Christmas and New Year message to the nation, the President of Ghana, Nana Akufo Addo described 2020 as the “Year of Roads.” This initiative certainly involves major construction and rehabilitation improvements that require superior design, construction, rehabilitation standards, and specifications if longer service lives are expected for these road projects under current and projected traffic conditions, while accommodating the needs of other road users. For several decades, design of transportation infrastructure and related systems in Ghana has relied heavily on heterogeneous design codes from various countries. The services of foreign consultants have also been used in the past three decades to develop codes and specifications for local use. However, such codes often lack sophistication and are not widely published for easy access. In addition, they are outdated and do not adequately serve the changing needs of the road user.

The downside of using heterogeneous and outdated codes is the inability to maintain consistency in design and construction standards, which can result in costly overdesigns or unsafe under design of infrastructure systems. While overdesign impedes the optimized use of limited resources and inequitable distribution of development projects, inadequate design can result in compromised public safety and welfare with potential for premature failures and excessive life-cycle costs. The “Year of Roads” initiative goes beyond 2020, and thus require the need to examine how best transportation infrastructure design and services can be effectively delivered. This paper will discuss a framework towards the development of an all-inclusive manual to provide guidance on standardization and integration of design practices for the transportation infrastructure sector.

KEYWORDS: Design, Standardization, Codes.

1-6 GTPF White Paper Series Technical Committees

Abstract

Ghana continues to make strides in its transportation infrastructure development programs through significant investments in the road, rail, aviation, and marine sectors. According to the Ghana Statistical Service, the transportation and storage sector contributed GH¢ 24.6 billion (12.8% of GDP) to the country's economy in 2017. However, there still exists opportunities for continued investment in Ghana's transportation infrastructure for sustainable and long-term development. Challenges faced by the various sectors include standardization of design and construction codes; lack of continuous monitoring of investments; insufficient preventive maintenance activities; and inadequate data for decision-making. The White Paper Series is an initiative by the Ghana Transportation Professionals Forum (GTPF) to bring together professionals and expertise in selected subject areas to address the following questions:

<p>1. Traffic Operations and Safety (engineering, enforcement, education, evaluation, pedestrian crossings, ITS)</p> <p>2. Asset Management (pavement monitoring, signs, markings, work zones, human resource management)</p> <p>3. Emerging Technologies (autonomous vehicles, vehicle-to-infrastructure communication, big data, smart work zones)</p> <p>4. Trade and Economics (freight and commodity flows, marine ports, freight rail, air cargo)</p> <p>5. Public Transportation, Bike and Pedestrian Facilities (alternative modes of transport, ride-share, BRT, passenger rail, passenger air)</p>	<p>6. Roadway and Pavement Design (highway standards, maintenance, materials, roadside safety, drainage design)</p> <p>7. Bridge and Structures (structural planning, geotechnical, design, review, construction, inspection, tunneling)</p> <p>8. Planning, Policy, and Right-of-Way (advanced planning, legislation, transport policy, right-of-way encroachment)</p> <p>9. Environmental (energy, emissions, persons-with-disability, work zones)</p> <p>10. Financing and Toll Operations (funding sources, funding allocation, alternative financing methods)</p>
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Technical Committees Coordinators

Dan P. Seedah, Ph.D., P.E., Senior Transportation Planning Engineer, Jacobs

Julius Codjoe, Ph.D., P.E., ITS/Traffic Program Manager (LTRC) & Research Assistant Professor at University of Louisiana at Lafayette

2-1 The Impact Of Covid- 19 Lockdown On Mobility And Environment

Charles Anum Adams^{1'a}, Gift Dumedah^{2'a}, and Samuel Ato Arkoful Andam^{3'a}

1. *Department of Civil Engineering, Kwame Nkrumah University of Science and Technology, Kumasi.*
2. *Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Kumasi.*
3. *Department of Geomatic Engineering, Kwame Nkrumah University of Science and Technology, Kumasi. a Regional Transport Research & Education Centre Kumasi (TRECK), KNUST, Kumasi.*

ABSTRACT

The COVID-19 pandemic which was first detected in Wuhan, China has certainly shaken the world, and overwhelmed healthcare systems with its alarming rate of infection. Declared a global pandemic on March 11, 2020 by the World Health Organization (WHO), the disease has since spread rapidly across the globe. COVID-19 has generated fear, panic and hardships of unprecedented proportion worldwide, in spite of the strict mitigation measures taken. In Ghana, the first incidence of COVID-19 was reported on 12 March 2020 after which a three-week partial lockdown was implemented from 30 March – 20 April, 2020. This presentation illustrates the space-time variation of the infection and its impact on urban mobility, road traffic situation, and environmental quality brought about by the lockdown in Greater Accra and Greater Kumasi metropolitan areas. As undesirable as it is, the lockdown resulting from the COVID-19 pandemic has provided invaluable hitherto unavailable opportunities in studying mobility and its relationships with the environment, epidemiology, economy, food security, and many more. This underscores the importance of mobility and environmental monitoring to the overall socio-economic development of the country. It is hoped that lessons learned during this time will inform future decisions in order to increase resilience to future occurrences.

KEYWORDS: COVID-19, mobility, air pollution, public health, environment.

2-2 The Design, Fabrication & Testing Of Infrared Traffic Counter On Selected Major Dual-Carriageways In Akure-Nigeria

Ajayi Samuel A. *The Regional Transport Research and Education Centre, Kumasi (TRECK), KNUST, samopresiddent16@gmail.com * Corresponding Author*

BUSARI Ayobami A. *Dept of Civil & Environmental Engineering, Tshwane University of Technology (TUT), Pretoria South-Africa. busariaa@tut.ac.za*

ABSTRACT

Conventional intrusive traffic counters such as inductive loop, pneumatic tubes, piezo-sensors are expensive to install and maintain, and are not readily available for various urban roads to facilitate traffic data collection, also manual counts by transport professionals have proven to be ineffective and prone to errors. This study designed, fabricated and tested an infrared traffic counter on the selected major dual carriageways in Akure metropolis. The counter was fabricated from these locally available materials such as Infrared transmitter and receiver, Microcontroller, LCD (Liquid Crystal Display), Oscillator, Connecting Wires, Mother board, Batteries, Capacitor, Resistor, and Pyrex plastic. The circuits for the infrared transmitter, microcontroller and receiver were designed by an existing software programs called "MIDE and "PROTUSE. Also locally designed counter, manual counts method and conventional counter were employed to collect volume. The infrared counter results were calibrated with the conventional counter and compared statistically through the SPSS. The $p > 0.05$ indicated that the results is not statistically different from the conventional counter. This research has shed light on the need to design locally made traffic counters which has overcome the demerit of manual counting on roads and eradicate the cost incurred in securing or purchasing an automatic counters.

KEYWORDS: Infrared traffic counters, volume, traffic congestion, conventional counter and dual carriageway.

2-3 Earthquake Considerations For Infrastructure Delivery

Ing. (Mrs) Carlien Bou-Chedid

Ghana is known to be subject to moderate levels of seismic activity with major earthquakes occurring several years apart. The most recent damaging earthquake occurred in 1939 and had a magnitude of 6.5 on the Richter scale. The largest on record however is the 1862 earthquake which had an estimated magnitude of 7.1. Losses that occur as a result of earthquakes are generally caused by the failure of infrastructure. Damage to buildings in particular, often accounts for most of the loss of life and destruction of property in earthquakes and it is therefore important for adequate measures to be put in place to ensure their resilience. Ghana has gone some way to addressing this concern through the introduction of a new National Building Code. Further guidance is however required for the existing stock of infrastructure as well as systems such as those for Water Supply, Energy Supply, Disposal, Transportation and Telecommunication which are critical for modern day living. These systems cannot rely solely on the technologies from structural earthquake engineering on which the building code seismic design considerations are based. Such systems may be networked and interdependent and their performance in an earthquake goes beyond the structural performance of the individual components. This paper considers the current situation with regards to infrastructure delivery in Ghana and examines the issues relevant to ensure seismic resilience.

KEYWORDS: seismic, earthquake, resilience, code.

2-4 Accra Traffic Management Center (ATMC) – Status And Updates

Amoo-Gottfried, J.¹

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Congestion is the major operational challenge facing the major cities of Ghana and many strategies over the years have been planned to address them. The strategies have included developing new roads, increasing of road capacities at the major links and intersections and optimizing roads through the use of technology. Urban space is expensive and limited and is not always available, limiting opportunities to physical widening. Ghana commissioned the ATMC for coordination of intersections one arterial road in, Accra, in August 2019, as a pilot to facilitate smooth flow of traffic in the city. The project has improved roadway and intersection capacity, safety and mobility needs for people and goods. The project commissioned represents the first phase of the planned interventions with the final phase for the rest of Accra expected to be completed by 2021. This presentation will cover the background, planning, implementation, and management of the TMC.



2-5 Innovative Intermodal Transport Option To Reduce Congestion Along Coastal Highway Corridors In Ghana

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ABSTRACT

Traffic congestion is a persistent and recurring problem affecting our urban areas with consequences for sustainable development. This condition becomes inescapable as the demands of users of a specific transport mode outweighs the capacity available for that transport mode. The effect of this situation is travel time delay which causes frustration, financial constraints and also reduction in man-work hours of commuters. Commuters are often frustrated by the policymakers' inability to arrive at a solution which poses a significant public policy challenge. This study presents a conceptual scheme on the possibility of introducing intermodal transport system incorporating water-based transport as an alternative to road-based options to alleviate congestion along the coastal areas of Ghana using Winneba - Mallam – Accra - Tema corridor as case study. The Government of Ghana project to develop a Bus Rapid Transit (BRT) system along the Winneba- Mallam- Accra Corridor hit a stumbling block due to unavailability of right of way, excessive infrastructure cost among other challenges. This means the situation persists and is getting worse by the day. The introduction of inter-modality of transport using the sea for water based public transport service is one that has not been explored but could be a remedy to alleviate the congestion problem along coastal areas. Who has ever deemed the sea as an alternative for the right of way? This could be combined with other public transport, walking, and bicycling measures – incorporates physical activity into everyday commuting and can improve health and happiness. The presentation will explore the approach, the modes and methods and then elaborate on the positives from such an innovation including: reduced frustration of drivers, improvement in travel time on the roads, opportunity to create jobs for the local fishermen, health and environmental benefits from the connections, revenue at park and ride services. The paper will elaborate the scheme as well as the web-based app-based ride sharing options that could be deployed.

KEYWORDS: Travel Time, Intermodal Transport, Congestion, Bus rapid Transit, Ghana.

2-6 Establishment of a Student Community Engagement Program Initiative.

Owusu-Ababio S.¹

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In the past 18 years, nonprofit Engineers without Borders-USA (EWB-USA) has worked with college students, engineering professionals, and communities to complete 681 infrastructure projects across the globe that have benefited nearly 1.2 million people. Fifteen of these projects have been completed in Ghana and have benefited 19,010 people. There are currently ten ongoing projects in Ghana, which when completed will benefit an additional 29,245 people. Unfortunately, as impactful as these projects have been, there has not been any meaningful involvement of Ghanaian students and engineering practitioners despite the caliber of academic institutions and built environment practitioners that Ghana possesses. Worldwide, racial injustices and COVID-19, in tandem, have disproportionately affected people of African descent as well. Consequently, there have been urgent calls from citizens across the African continent for Africa to intensify its developmental efforts in order to uplift its own people and raise the continent's global standing. In Ghana specifically, COVID-19 combined with perennial flooding continues to expose inherent vulnerabilities in Ghana's infrastructure systems with devastating impacts on the economy and the most vulnerable in society. To alleviate those inadequacies, this presentation outlines a student community engagement initiative that brings together Ghanaian students, engineering practitioners, and communities to address practical problems through science, technology, and engineering methods. Furthermore, the initiative will promote educational and leadership opportunities not typically provided in traditional academic settings.

KEYWORD: Students, Communities, Engineering Professionals

3-1 The Covid-19 Pandemic Social Distancing And Health Protocols In Public Transport And Its Impact On Safety, Security Of Passengers And Operational Sustainability

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ABSTRACT

This paper is part of an on-going Covid-19 pandemic public transport survey in selected cities in sub-Saharan Africa. The mobility situation around the globe has been affected with unprecedented economic downturn due to the stay home, work from home, closure of schools, universities, production lines, borders, airports and general businesses etc. Trips by frontline medical professionals or essential services such as supermarkets, pharmacies, etc. were unrestricted. Many countries including Ghana declared some form of lockdown in cities, and instructions for social distancing among people including public transport passengers. In this study, we sought responses for the following research questions; to what extent were the social distancing and other pandemic health protocols observed for the safety and security of public transport passengers? How did social distancing and the lockdown restrictions impact fleet availability at major terminals? What was the impact of the restrictions on public transport revenues? Observers recorded the GPS coordinates of various terminals and obeying all pandemic protocols randomly selected respondent drivers or station masters to collect their phone numbers for later interviews to reduce risk of virus transmission. Questionnaires were used to elicit data about transport operations in the pre-lockdown and lockdown situations, social distancing and pandemic health protocol practices, fleet availability and the farebox. The results provide insight on how the social distancing and pandemic protocols practices posed a risk for covid-19 virus transmission, fleet availability and the impact on operational sustainability of public transport in African cities during the pandemic.

KEYWORDS: Covid- 19 Pandemic, Lockdown, Public Transport Sustainability, Social Distancing, Passenger Safety.

3-2 Macroscopic Safety Models For Hot Zone Identification

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Background

All too often, engineering strategies aimed at improving roadway safety focuses on specific locations on the roadway (e.g. intersections and roundabouts) and after the crash has occurred (blackspots). Again, models developed at specific location (micro level) to understand the various factors that influences the occurrence of crashes mostly focuses on roadway characteristic. Although such micro level approach and developing interventions to reduce crashes is vital and has proven to be very successful, it is a reactive approach to addressing the road safety problem. However, transportation professionals should also take a proactive approach that addresses road safety before problems emerge and understand how other non-roadway characteristics contribute to road traffic crashes. In this study, I share how analyzing and modelling crash frequency at the macroscopic level provide an insightful tool to investigate traffic safety problems, using examples from Melbourne, Australia. The study has two objectives; (1) to demonstrate safety modelling at the macroscopic level and (2) to demonstrate the importance and application of macroscopic safety models for transport hot zone screening.

Method

The first step in macroscopic safety modelling is to gather the necessary data and aggregate them into an appropriate spatial unit. Data for this study include crash data, land use data, socio-economic data, demographic data, and network data. All these data are aggregated into statistical area level 2 as defined by the Australian Bureau of Statistics (ABS). Various models such as the negative binomial, random parameter and geographically weighted Poisson regression are used to understand how the various factors influences crashes. Safety performance functions (SPFs) were developed for total, serious and minor injury crashes. Potential for Safety Improvement (PSI) was also developed and used as a measure of crash risk. Three screening categories were also developed from the PSI for hot zone screening.

Results

The result demonstrates the capability of macroscopic safety models and PSI measures to identify hot zones in a large metropolitan area. For example, in the total crash model, 9 zones (3.11%) were identified as in the top 10% for priority treatment. An important observation made is that 49.54% of the zones for total, serious injury and minor injury are warm zones. This result indicates that nearly 50% of the zones have the potential of becoming hot zones in the future.

Conclusions and policy implication

Macroscopic safety analysis is of critical importance as it provides transportation professionals with an essential tool in incorporating safety considerations into long term transportation planning. It is expected that safety practitioners will be able to suggest appropriate safety countermeasures that would be effective in dealing with the hot zones as identified using the PSI screening method.

KEYWORDS: Macroscopic, Safety, Planning, Crashes

3-3 Seatbelt Use Among Vehicle Occupants In Accra Area, Ghana

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The study was undertaken to determine the seatbelt use rates for drivers and front-right passengers of vehicle occupants in the Accra Area in Ghana. Vehicles were unobtrusively observed at 35 randomly selected locations where vehicles came to a halt or slowed down considerably such as signalized intersections, toll booths, roundabouts, and priority intersections.

Overall, the seatbelt use rate of drivers in the Accra Area was (74.7%) compared with the rates for front-right passengers being 24.7%. Generally, seatbelt wearing rates for females as drivers or passengers were significantly higher than their male counterparts ($p < 0.001$). Drivers' use of seatbelt was highest within the Accra city (84.2%) followed by those on the major highways (72.4%) and lowest on other roads at the outskirts of Accra city (59.7%), $p < 0.001$. The study recommended that the National Road Safety Authority (NRSA) in collaboration with the police should enforce the seatbelt use by passengers as well as for drivers especially in the outskirts of Accra city.

KEYWORDS: Seatbelt use, Drivers, Accra Area, Front-right passengers, Vehicle occupancy.

3-4 Road Traffic Data: Overview And Recommendations For Collection Methods and Applications In Ghana

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Accurate and precise traffic data is essential for supporting a large number of transportation-related decisions and is a significant and critical component for many traffic-related researches; and project planning, design, construction, operation, monitoring and maintenance. From ancient times till date, traffic data collection methods, both permanent and temporary, have evolved from manual, transitioned through mechanical and automatic and currently emerging to highly complex mechanisms in many parts of the world today. Whereas the manual methods may be better suited for certain situations in terms of initial capital investment and project scale, the automatic methods offer several advantages in the areas of accuracy, costs, and safety and are preferred in a lot more scenarios such as areawide data collection. That notwithstanding, traffic data and its collection methods, whether manual or automated must be accurate, affordable, easy, and sustainable such that every locality can apply the methods in totality. Most routine data collection methods in Ghana are still more manual than automated. This paper is a summary of a literature review of various traffic data collection methodologies, the advantages and disadvantages, similarities and differences, affordability, and adaptation. The paper mentions some Intelligent Transport System data collection methods that have already been used in Ghana. The paper also looks at the future of big data and makes recommendations to stakeholders for a shift to modern collection methods for an improved, more efficient, and effective data for optimum project planning and management in the transportation system.

3-5 Advancing The Development Of A Transportation Data Hub

Dan P. Seedah, *Ph.D., P.E. Senior Transportation Planning Engineer, Jacobs Engineering, Austin, Texas*

Data collected by transportation agencies is critical in identifying needs and supporting the various phases of infrastructure development: planning, construction, operations, maintenance and monitoring. Disparities in geographical scale, temporal granularity, data processing methods, modeling assumptions, and file sharing formats creates a challenge for practitioners seeking to utilize data collected by different entities. There is thus a need for transportation agencies to pursue partnerships that foster coherence in how data is collected and disseminated. A transportation data hub provides an opportunity for agencies involved in data collection to share data amongst themselves and other interested stakeholders to foster collaboration on data collection efforts. The Ghana Transportation Data Hub is introduced in this presentation as an initial attempt to encourage stakeholders involved in the common goal of improving infrastructure development in the country to collaborate and share transport related data. The data hub consolidates information from multiple sources in the areas of transport safety, trade and economics, existing roadway infrastructure, and geographical information system data. Strategies to help address identified challenges when developing a data hub such as institutional commitment, human resource availability, technological infrastructure, and adequate funding is also presented.

KEYWORDS: Data, Data-hub, Transportation.

3-6 Primer To A National Infrastructure Dialogue

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ABSTRACT

The Ghana Infrastructure Conference series began in 2018 as a biennial gathering for dialogue on the state of the country's infrastructure. Given the composition of the organizers, discussion topics initially focused on transportation infrastructure. However, it soon became apparent that transportation may initiate the dialogue, but there are many other types of infrastructure that are just as essential for physical and economic growth of the nation. The Ghana National Infrastructure Dialogue is conceived to initiate holistic reflection on the comprehensive groups of infrastructure that are essential for nation-building, socioeconomic development, and improvement in quality of life. This presentation is a recap of the various components of infrastructure, their importance and interrelatedness, and a few questions to ponder as we gear up to review, analyze, and plan for them. Ultimately the dialogue is to paint a picture of the state of Ghana's infrastructure, identify problems, issues, and shortcomings to address, and describe future infrastructure needs for: transportation, energy, municipal public facilities like water supply and sanitation, communication facilities, educational facilities, and housing.

KEYWORDS: Infrastructure, Dialogue, Components, Interrelatedness

4-1 Kotoka International Airport Project Updates

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ABSTRACT

The Kotoka International Airport (KIA), has seen a significant rise in the passenger throughout from 1998 to 2020. The significant rise became evident after the completion of Phase 2 of the development plan. It is worthy to note that the choice of one airport over another is largely depended its ability to meet customer's needs, i.e., the efficiency of processing both arrivals and departures (passengers and airline operators) and the environment. In addition, the Kotoka International airport has, over the last 24 years seen significant improvement in its infrastructure. This presentation addresses the development philosophy and the current developments including an enhancement program for the apron and taxiway.

KEYWORDS: Airport, Kotoka International.

4-2 Africa Catalyst Project – Overview And Updates

This presentation will include an introductory note from Royal Academy of Engineering and subsequent overview of the emerging findings of Global Challenges Research Fund (GCRF).

The Global Challenges Research Fund (GCRF) is a £1.5 billion fund announced by the UK Government in late 2015 to support cutting-edge research that addresses the challenges faced by developing countries. Alongside the other GCRF delivery partners it seeks to create complementary programmes that:

- Promote challenge-led disciplinary and interdisciplinary research, including the participation of researchers who may not previously have considered the applicability of their work to development issues
- Strengthen capacity for research, innovation and knowledge exchange in the UK and developing countries through partnership with excellent UK research and researchers
- Provide an agile response to emergencies where there is an urgent research need.

The aim of GCRF Africa Catalyst is to strengthen professional engineering bodies in sub-Saharan Africa so that they can effectively promote the profession, share best practice and increase local engineering capacity, to help drive development.

Wariara Waireri is the Senior Manager for International Development at the Royal Academy of Engineering. Drawn to the possibilities and aspirations for economic and social prosperity on the Continent, she is working to build sustainable societies and inclusive economies for everyone, with a focus on Africa.

Andrea Broughton is an Associate Director at Ecorys, with over 20 years' experience in conducting and managing social research. She has carried out a number of sectorally-focused projects in sectors such as manufacturing, road transport, the automobile repair sector and construction, including as a Principal Research Fellow at Institute for Employment Studies. As Deputy Project Director of Ecorys' GCRF Africa Catalyst research, Andrea co-leads and provides quality assurance across all workstreams.

Sarah Hanka is a Research Manager at Ecorys, managing and conducting qualitative research primarily on health and development projects for clients including UK Department for International Development (DfID), UNICEF and WHO. Sarah is leading the dissemination workstream for Ecorys' GCRF Africa Catalyst research, as well as supporting research into best practices and Covid-19 responses in the engineering sector.

4-3 Impact Of Urban Transport On Poverty, Economic, And Environmental Outcomes Within GAMA

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Cities are constantly faced with the numerous socio-economic and environmental problems that are typically associated with economic development and population rise. The population of Ghana's capital city, Accra, is rapidly increasing at an average of 3.1 per cent per annum within the last decade. Currently, there are an estimated 4 million residents in the Greater Accra Region. The Greater Accra Region is home to 16 per cent of the country's population and is the most urbanized region. Two factors account for this; immigration from other regions and natural increase. The objective of this study seeks to carry out an assessment of the impact of urban transport on life in city in all its dimensions—including mobility for the poor, disabled, women and children. The study also looked into the impact of urban transport on safety, environment, economy, health, business, and trace its changes over the past decades. Two approaches were adopted for gathering available quantitative data for the assessment. These are: Literature review on available reports and publications and contacting the agencies/departments and the general public in GAMA for relevant data, which were not readily available in prints or online. Results from study on pollution along highways in Accra indicated that of the total 745 samples investigated about Seventy-five (75%) percent exceeded the EPA-Ghana 24-hour PM-10 air quality guideline of 70 $\mu\text{g}/\text{m}^3$, and 87% exceeded the WHO Air quality guideline for 24-hour PM10 of 50 $\mu\text{g}/\text{m}^3$. Pedestrians and human error are identified as the most prevalent contributory factor to the occurrence of Road Traffic Accidents (RTAs). Sprawl in GAMA has been identified to lead to increasing trip distances/time and have contributed to the worsening congestion levels in the city, costing up to \$1.3 billion a year on productivity for traffic entering and leaving the CBD.

4-4 Digging Our Way Out Of Corruption: Is It Feasible? The Role Of Ethics

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It is common knowledge among Ghanaians that corruption has deep roots in every fabric of society; from culture to politics, education, public service, and economy. The pervasiveness of corruption points to a toxic combination of motive, opportunity, and a culture of silence. The motives often cited to justify corrupt practices in Ghana include survival in a non-living wage economy and the burden of caring for a plethora of dependents. The opportunity for corrupt practices is made available through a non-transparent culture that indirectly promotes ethical misconduct. Additionally, there is a high probability of evading punishment in the context of a flawed and corrupt justice system compounded by weak enforcement of laws. As engineering professionals, we know that projects are the building blocks of national development; any corruption associated with an infrastructure project is analogous to an invisible crack in that building block. The question is, how can a society entrenched in corruption change? This paper addresses the major factors leading to corruption in Ghana and their social, economic, and political impacts. This paper further recommends approaches to mitigate these impacts.

KEYWORDS: Corruption, Ethics, Ghana.



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1. Provide research and professional advice in the areas of transportation infrastructure and related systems planning, design, construction, operations, maintenance, security, ethics, environmental protection, and excellence in professional practice.
2. Provide a global platform for public expression and information exchange.
3. Foster creative collaborations with public and private agencies, communities, and academia regarding transportation- related issues.

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- TRECK is a Government of Ghana supported, World Bank financed premier Africa Centre of Excellence (ACE) for transport and logistics hosted at the College of Engineering, Kwame Nkrumah University of Science and Technology Kumasi.
- It maintains collaboration with national, regional and global academic partners and transport sector stakeholders.
- TRECK seeks to address the developmental challenges facing the transport sector within the sub-region through applied research, relevant educational programmes, provision of professional short courses, leadership and development of strategic networks.

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Our vision is to be the leading hub for advancing applied research knowledge, developing and adapting innovative technologies, providing high quality training, leadership, and technology transfer in transport, mobility and integrated logistics.

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- Collaborating with other researchers for knowledge sharing and advancement;
- Being a key training centre for transport and road safety resource;
- Being a stakeholder in the coordination support for the integration and growth of all modes of transport and,
- Establishing a data hub to support research and industry.

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Celsus Corporation is an international consulting firm that helps governments and other infrastructure agencies to address the various tasks faced by civil engineers and managers at each of the several phases of infrastructure development – needs assessment, planning, design, construction, operations (including monitoring and maintenance), and end-of-life.

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“Enhancing Transportation Infrastructure for Accelerated Socio-Economic Development”

The 2018 Ghana Infrastructure conference (GIC-2018) brought together policy makers, practitioners, and students from Ghana, the United States, and other African Countries. It was attended by the Hon. Senior Minister, Ministers of Roads and Highways, Transport, Railways Development, and Aviation. One of the key outcomes of this conference was the development of a summary document of recommendations for the transportation sector in Ghana.

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