

Saying Aloha to a light metro



Photo: David Lustig

RELIEF Honolulu's elevated light metro project is seen as its great hope to relieve crushing road congestion on Oahu, with operations expected to begin in 2016. David Lustig investigates.

Located on the island of Oahu in Hawaii, Honolulu has something for everyone. It is a premier tourist destination, enjoying tropical weather and picturesque beaches. It also has a modern, vibrant central area and business district rivalling other major cities in the world, whilst offering the first physical contact with the USA for many Pacific Rim countries. The city, and the entire island, are truly in the big time. But so is the traffic congestion.

In 2010, the official census found Honolulu's population hovering at about a million people. With only a limited bus network offering mass transit, the city now has road congestion rivalling that of Los Angeles or London. Commuters leaving suburban housing areas on the western (Ewa) side of the island headed to the city centre can sometimes take 2 h or more for their 30 km morning and evening commutes.

Enter HART — the Honolulu Authority for Rapid Transportation.

The initial plan for easing traffic congestion was launched in 2005, proposing both elevated and at-grade rail lines, more buses, and high-occupancy vehicle lanes. This plan was presented to Honolulu City Council the following year for the purpose of selecting a preferred model and the general alignment for high-capacity transit service on Oahu. An elevated light rail line was eventually selected. HART formally came into existence during the 2012 financial year, when the board of directors, staff, and consultants made substantial progress towards their goal of bringing rail services to Honolulu.

During the year which ended on September 30 2012, the board of directors appointed as Executive Director & CEO Daniel Grabauskas, former CEO of Boston's Massachusetts Bay Transportation Authority. Chief Financial Officer Diane Arakaki has

experience in governmental financial management.

Additionally, the Board of Directors adopted formal operating rules, a financial policy, policies on ethics, procurement, change orders, equal employment opportunity, transparency, an operating and capital budget and a six-year capital improvement programme. A design contractor was selected for the airport guideway segment, and archaeological surveys continued along the alignment.

And last month the Federal Transit Administration agreed to award a \$1.5bn full funding grant towards the estimated project cost of \$5.2bn.

Fully-automated light metro

Although initially envisaged as a light rail line, the route has now morphed into a light metro, being designed for fully-automated driverless operation. The double-track line will

HART Executive Director & CEO Dan Grabauskas says Honolulu has 'the worst vehicle congestion in the United States'; it can sometimes take 2 h to drive 30 km.

serve the urbanised southern shore of Oahu, a narrow corridor sandwiched between the Pacific Ocean and two mountain ranges. It will thread through key employment centres including downtown Honolulu, Joint Base Pearl Harbor-Hickam, Honolulu International Airport, and Ala Moana Center. These areas together house approximately 80% of Oahu's total population, of which around half is located in the so-called Primary Urban Center. These areas also account for about 440,000 'employment opportunities', which is equivalent to 88% of all jobs on the island.

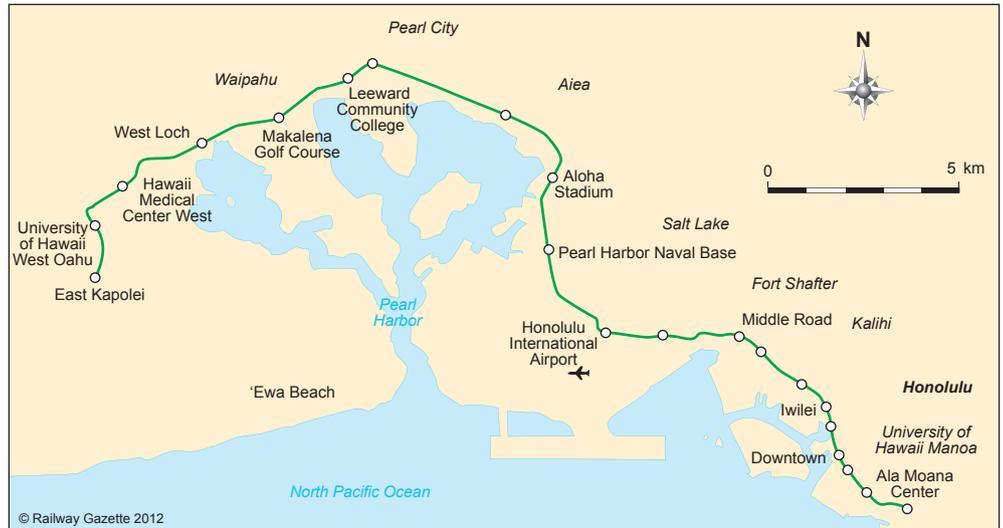
The 32 km line will be fully segregated, and almost entirely elevated, following or paralleling existing mass transit corridors. The only exceptions will be a 1 km section at ground level near the Leeward Community College station, where the maintenance and storage facility will be located on the site of a former Navy premises.

Running from East Kapolei, in West Oahu, to Ala Moana Center, near Waikiki, the line will have 21 stations. It is expected to open in four phases, with the first expected to be completed in 2016. The westernmost section from East Kapolei to Aloha Stadium will open in 2017, with the remainder of the route to open by 2019.

Along the route

Starting from the western terminus at East Kapolei, Phase 1 will follow Kualakai Parkway in a northerly direction to serve the University of Hawaii's West Oahu campus. From there it will turn east and south to meet and then parallel Farrington Highway.

Continuing in a northeasterly direction, the metro will then descend alongside Waipahu High School to ground level to reach the depot area. After serving Leeward Community



College, the line will climb back onto viaduct to cross the H-1 freeway, turn eastward again along Kamehameha Highway. The second phase will continue through the Pearl City and Aiea communities along the median of the Kamehameha Highway, cross over H-1 again and continue to where the Moanalua Freeway extension joins Kamehameha High at Aiea Stream, and terminate at Aloha Stadium station.

From here, Phase 3 will return to the Kamehameha Highway median and intersect with the Nimitz Freeway, before diverging from the freeway

alignment to serve a series of stations in the downtown area. The final phase will follow Dillingham Boulevard in Kalihi, paralleling the Nimitz Highway and finally run along Halekauwila Street to Ala Moana Center.

The automated line will serve the downtown district, three university sites and the island's most important residential areas.

Construction begins

Column and foundation construction commenced in April 2012, with the drilling of the first of around 50 guideway support columns for the 4 km West Oahu/Farrington Highway section. The first completed column



Above: Attractively-styled open-air stations will help in persuading residents to switch from driving to catching the metro.

Left: Platform screen doors will be fitted to prevent passengers from falling on the track in front of the driverless trains.



Images: HART

was officially unveiled at East Kapolei on June 8. With construction being concentrated on Phase 1, utility relocation, shafts, and column construction on this section are scheduled to be 50% complete by the end of fiscal 2013.

The entire line will have around 700 support columns, which together with the elevated guideway will require 8375 tonnes of steel reinforcing bar, 300 000 m³ of concrete and 132 km of rail.

Design of the 17.4 ha maintenance and storage facility has already been completed, and construction of the depot area is also expected to be 50%

complete by the end of fiscal 2013. Contracts have been awarded for train control, communications, operations and maintenance, and these are all now in the design stage, with overall completion estimated at 15%.

Equip and operate

Electrical and mechanical systems, including signalling and rolling stock, are being supplied by the Ansaldo Honolulu Joint Venture, under a \$1.4bn contract covering design, construction, operation and maintenance. Broken down, the contract includes \$574m for the design, construction and delivery of 80 EMU cars and the train control system, with the remaining \$830m covering operations and maintenance over an initial 14-year period. Ansaldo STS is responsible for train control and operations, whilst the trainsets will be supplied by AnsaldoBreda. The first cars are expected to arrive by 2014, with the remainder by 2018.

Operating at a maximum speed of 80 km/h, the trains will be fully automated and driverless, although HART is expecting to deploy attendants on each train during the start-up period, both to provide information and support for passengers unused to rail and to enable manual intervention in the event of any malfunction. According to HART, a driverless option is possible because the elevated fixed guideway provides an exclusive right-of-way with no road vehicle or pedestrian crossings.

The trains will take power at 750 V DC from a third rail, which in turn will be fed from 'around 14' substations spaced at approximately 2.5 km intervals along the route; the exact number of substations is to be determined during final design. Ansaldo STS is supplying the automatic train

control and ATO technology, along with a comprehensive range of communications and security facilities including emergency telephones, CCTV and public address and information display systems.

The fleet of 40 two-car trainsets will be able to accommodate up to 6280 passengers per hour per direction in the initial years of operation. Additional vehicles will be added to the fleet as demand grows in the future, and HART says the line is being designed so that vehicles from more than one supplier could operate on the guideway once integrated with the non-proprietary train control system. The maintenance and storage facility is being designed to accommodate up to 150 cars.

Operating plan

Once completed, the line is expected to operate for 20 h per day, from 04.00 until midnight. Trains will operate at 3 min headways during peak periods, every 6 min during the day and every 10 min in the late evening. End-to-end journey time is estimated at 42 min. Planners are expecting an average weekday ridership in 2030 of about 114 000 passengers, with a maximum peak hour flow of about 8000 passengers per hour per direction in the same year.

Each trainset will be able to carry a minimum of 300 passengers. Since the contract award HART's board of directors has announced the intention to add an extra 800 seats to the initial fleet, increasing the number of seats in each two-car train from 76 to 96, whilst still retaining room for luggage, bikes and surfboards, which is probably a first for a US light metro. Trains will operate as two-car or four-car sets, and the stations are being designed to accommodate four-car formations with a maximum length of 75 m.

A unified fare structure is planned, which will be integrated with the island's existing bus system, TheBus. Passes will work interchangeably on both modes and seamless transfers will require no additional fare. Ticket vending machines will be installed at all stations, although TheBus is assumed to continue using standard fare boxes. HART plans to adopt a barrier-free approach, with no gates or fare inspection points at the stations. Station areas including the platform will be designated by signs and floor markings as a 'fare paid area', with proof of payment to be checked by roving inspectors. ❏

Construction work is well in hand, with the first of the 700 viaduct support columns already completed.



A battle of HART and minds

Wherever new rail projects are planned, whether it is in Washington, Oregon, Massachusetts, or even Honolulu, opposition is usually not very far behind.

Despite drowning in a sea of auto traffic, not everyone on Oahu loves the idea of the Honolulu light metro. Lawsuits were filed to stop the project by declaring the Environmental Impact Statement was flawed. Some opponents felt the project was motivated by politics, including former Hawaii governor Ben Cayetano, who was running for Mayor of Honolulu against pro-rail candidate Kirk Caldwell in the mayoral election on November 6. Cayetano felt more buses would offer a more flexible solution, while Caldwell, who won the election, saw rail as the superior answer.

While some surveys suggested the majority of people on Oahu had turned against the metro, the man leading the local transit authority saw it differently. 'Large public works projects have always had their share of debate and controversy,' says HART Executive Director & CEO Dan Grabauskas. 'Lawsuits are par for the course.'

And he should know. His last job before coming to Hawaii in April was as head of Boston's Massachusetts Bay Transportation Authority, the oldest rail transit operation in the USA. 'We recently cut the ribbon on MBTA's 13th commuter rail route, a restoration of three old lines that had gone fallow in the 1950s,' he reports. 'Reopening them was held up by environmental concerns for a dozen years. Yet, every politician that fought its reopening was present for the first train ride when the line reopened. And as far as I know, they're still riding it.'

When change of any kind is proposed, Grabauskas accepts that the residents of a specific area always find grounds for a battle. Part of the reason, he feels, is generational. Informal surveys suggest that older residents are not as enamoured of rail as younger ones. The coming of the light metro is another sign that the already-congested metropolitan area is slipping further and further away from the days when Hawaii's islands enjoyed a slower pace of life. But younger generations feel strangled by the ever-increasing traffic knots and yearn for an easier way to get around.

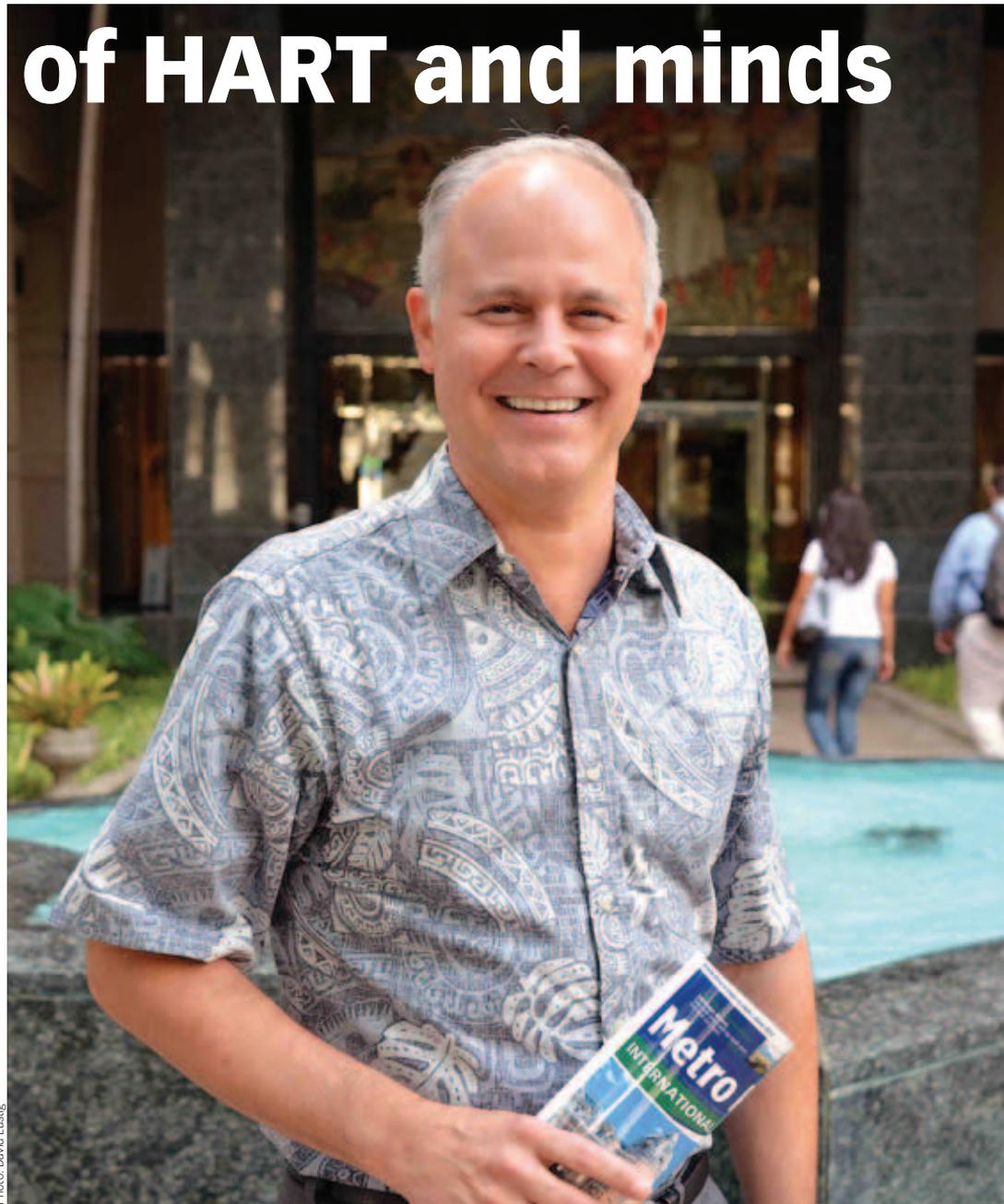


Photo: David Lustig

CHALLENGE Building a rail system from the ground up can be an exciting, and sometimes frustrating, experience, admits HART CEO Dan Grabauskas.

'One of the toughest discussions in Oahu is getting people who haven't travelled off-island a lot to conceptualise what a passenger rail system is like. It's hard for many to understand what it would be to travel from point A to point B on a right-of-way that has no other traffic, fewer safety concerns, no pedestrians, and a reliability that is going to be better than anything they've ever experienced.'

One public question that constantly floats to the surface is, 'what is HART going to do for me?' Grabauskas knows the answer, but it still can be an uphill battle to get the point across. 'There

has been a lot of discussion for close to 40 years. The citizens are used to buses and don't know about rail. Solutions that have been raised include: more lanes on the highway, contra-flow lanes, high occupancy lanes, bus rapid transit, operations on the ground, over ground, underground, and, of course, light rail. Every permutation of every solution has been looked at.'

His answer is simple: give commuters an alternative to sitting in slow-moving traffic every day. 'This rail project is going to allow commuters the reliability of getting from one place to another at the same time every day.'

Right now, their 30 km trip could take 60 to 90 min. But if it rains or a car stalls, it can take more than 2 h. HART, on the other hand, means reliability.'

Sustainable alternative

Grabauskas says people want sustainable growth on Oahu, so he has been reminding islanders that HART will run on electricity, not fossil fuel. 'We not only have the worst vehicle congestion in the United States, we have the highest gas prices. I ask people "how would you like to give up one of your cars, spend less money on gas, and not have to leave home early to catch a bus? And if you miss that bus, the next one may not come for 30 min." Our system, when it's fully oper-

ball game a half-hour earlier because they can continue to do emails on the way home, that's an advantage.

'When we did that in Boston, we found the loyalty of our customers. They were our best salespeople. They went and told other people. They can let someone else do the driving, and can get there on-time, every time. It's a lot less expensive when you look at gas, insurance, automobile wear-and-tear, and maintenance. It's never going to be one thing that will convince people to try rapid transit, but rather a cumulative effect of many.'

To be successful, he says, rail operators also have to understand how people live. 'We're going to the airport, so we'll have a space for luggage. We want to be bike-friendly, so we're

never gets too cold, it never gets too hot. So our stations are going to be greener because they're open air, I don't need to worry about air-conditioning and heat, or sun and shade. High temperatures can kink the rail. Not here.' But one aspect Grabauskas had to understand was the island's preference for building in concrete. 'One thing about the moist climate here, we have lots of termites. We don't do much with wood. We're trying to build something for 100 years. So concrete and rebar is just about as good as you get.'

But why is construction starting at the farthest point away from downtown Honolulu? 'We needed to put the brains and trains someplace,' he says. 'And the farther you get away from downtown, the less expensive the land. Even if you could find space for a maintenance facility in one place, none of the high-rise development owners want to look down into a rail yard.'

An area where Grabauskas feels HART will make a big impact is with the University of Hawaii, which has three campuses along the route. At one end is the West Oahu campus, the Leeward Community College is near the middle and at the other end is the UH Manoa campus. The university's vision is that HART could give it a 'virtual campus' spread across the island. All the disciplines of a particular major don't have to be stuffed into one location. Students could take a class on one site in the morning and an afternoon class at another, without any problems getting from campus to campus.

Like every rail project, there are local issues that must be addressed. One is native burial grounds. Native Hawaiian burial rituals go back thousands of years, and the bones were buried in relatively shallow grounds, typically in sand or sandy soil near the coast. The family members knew where they were buried, but there were no markers. Their whereabouts were unknown.

Now, centuries later, the metro construction teams are beginning to find those burial sites, temporarily halting work. 'There are protocols you go through,' says Grabauskas. 'Because the rail system will be an elevated structure with pillars approximately every 40 m, we can adjust the column locations around those areas, preserving the dignity of the burial ground.'

As Grabauskas looks out of his office window over downtown Honolulu, he points out the statue of King Kamehameha. 'It's exciting to come from the oldest transit system in America to help create the newest one.' 

'Large public works projects have always had their share of debate and controversy'

Dan Grabauskas CEO, HART

ational in 2019, will have a train every 3 min. Even if someone doesn't ride it because they need their car to go to places where HART may not run, it will still take many cars off the road.'

As with most major cities, a fundamental problem is convincing a car-oriented culture out of their vehicles, although Grabauskas says there is already a strongly transit-oriented population. 'TheBus is one of the most successful transit systems by any metric, in the top three or four on a per capita ridership basis.'

'To build on that, I think we need to come up with creative ways to show a competitive advantage. Even if motorists have to sit for a long time, they can convince themselves it is worth it to be in the comfort of their own car, at the temperature that they want, listening to the music that they want, and, perhaps just as importantly, the peace and quiet they want. But there is a breaking point, where getting to your destination quicker every time is more attractive. Reliability can be a very attractive alternative.'

Grabauskas insists that besides being comfortable, safe, and clean, rail must offer advantages drivers can't find in their car. 'One of the most successful things MBTA did that I'd love to do here is to put free wi-fi on all of our trains. It is illegal to text and drive, so we can provide something a driver can't do in a car. A rider can sit there in their 20 min commute and get a slew of emails read before walking in the door. Or get to their child's

going to have a bike policy. We're on a tropical island. Many people like to surf. So yes, HART is going to have space to bring surfboards on board the train. If we want to get people to ride, we know we're going to have to provide things like that.'

Integrated feeders

But, HART won't be going everywhere. Bus-rail integration will be essential to get people to their destinations, once they get off the train. 'We've had a number of meetings with the management of TheBus, which is run by the City and County of Honolulu separately from HART. We're making sure that long-haul buses will be redeployed into the stations as feeders. We're working on a single fare media, a smart card that will get people seamlessly on both. We're also looking at a unified fare structure.'

Ever the optimist, Grabauskas even sees the tropical weather as an advantage to operating an efficient rail system. 'As winter approaches Boston, I would begin snow action plan meetings. I'd be worried about switch heaters, and snow removal. I'd be sending out letters to public works department heads of cities and towns that when they are putting down salt, please don't put extra salt at grade crossings; it's going to affect the rail, and the sensors. You don't have to worry about that in Honolulu.'

'We're in a temperate climate. It