Cable Propelled Transit

aka

Urban Gondola

Edmonton Transit System Advisory Board

Urban Planning Committee - 5 June 2018

Good morning!

Edmonton Transit System Advisory Board (ETSAB)

12 citizen volunteer members, appointed by Council

Advise Council and Administration on matters of public transit

Conduct research on topics of interest to the transit system

Where it Started

~ 2013

Edmonton starts talking about River Valley Access.

2015

River Valley Access Concept Engineering Report devotes exactly 1 paragraph to considering aerial trams.

(7 short paragraphs consider trams/gondolas/chairlifts overall)

Where it Started

Late 2016

ETSAB generates ideas for yearly research work plan.

Q2 2017

Work plan authorized. Research begins.

April 2018

ETSAB accepts the sub-committee's report.

What people are saying:

What people are saying:

“They haven’t even legalized pot yet. I don’t know what all the rest of you have been smoking, but this is nuts.”

What people are saying:

What people are saying:

I'd like to go on record stating that I hate this idea. There are 1000 better ways to spend this money to create a more walkable, accessable, and bikeable city.

I'm going to be the oddball and say I'd love something like this so much I'd buy yearly passes and just ride around on it aimlessly.

Actually, it would be great to have an easy, active-transport way to cross the river. However, @CityofEdmonton has done very poorly with things like escalators, funiculars, LRTs. Would hate to get stuck 1/2-way across the river!

What people are saying:

Ryan Jespersen @ryanjespersen · May 31

Replying to @PonNatalie

The gondola will be an unreal addition to #yeg!

6 13

Ian Gordon @iantylerg · May 31

Replying to @PonNatalie @andrew_leach

May the entire Edmonton transit system be made up of gondolas, funiculars, moving sidewalks and river boats

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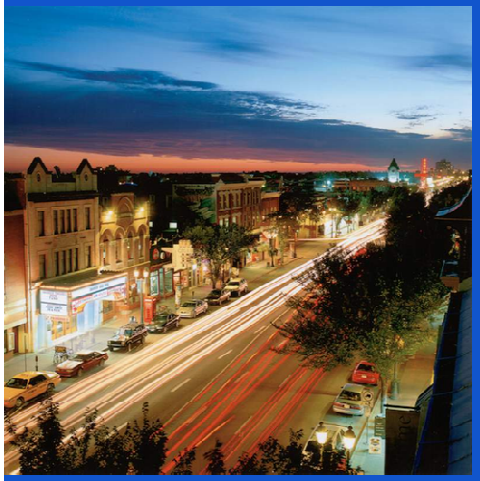
WHY GONDOLA

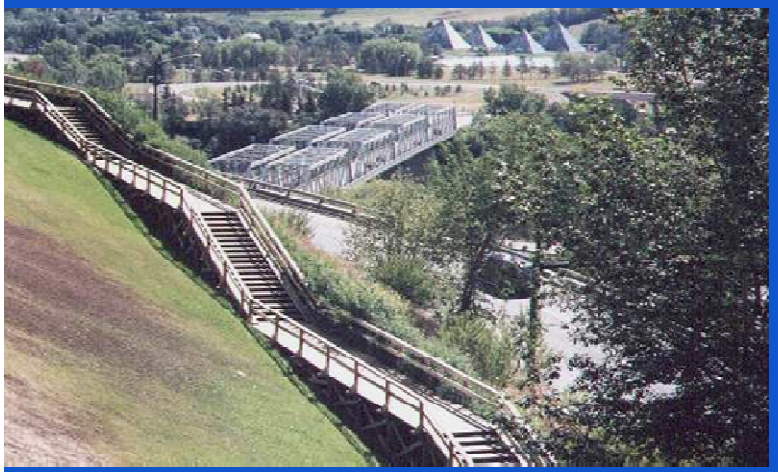
?

Here's the Problem:



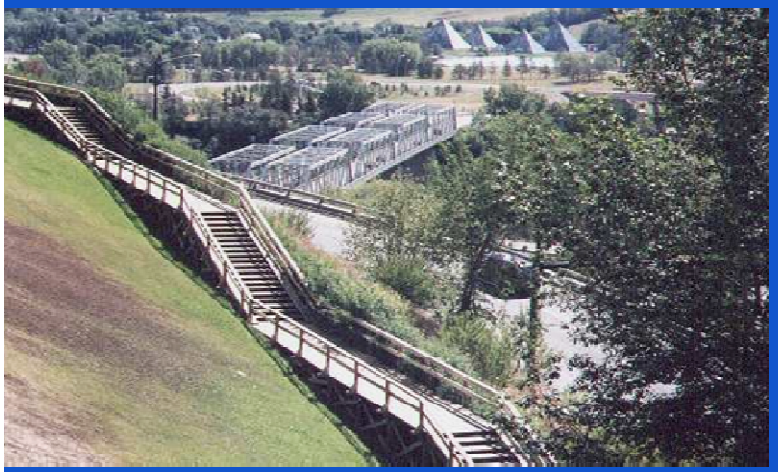
Whyte Ave - River Valley/Rossdale - Downtown

Here's the Problem:



Challenge of elevations and expanse

Here's the Problem:



~70 - 100 m elevation changes

2.5 km between

Here's the Problem:

Two major hubs without direct connections to their centres

Difficult for locals and visitors to hop between

Whyte Ave and Downtown

Here’s the Problem:

An LRT line could be three decades away

Here's the Problem:

Catalysing programming and development to preserve
the Rossdale power station site is impossible
without efficient and direct links

Here's the Problem:

Both sides of River Valley still difficult to access for many people

Here’s the Opportunity:

Here's the Opportunity:

2 major destinations - and hopefully, someday, a third

WHAT

are we talking about?

There's several different terms:

Gondola

Aerial Tram

Cable Car

To be specific:

The current generation of advanced systems are the:

TRICABLE DETACHABLE GONDOLA (TDG/3S)

("*Cable Car Confidential*, 2013")

(3)
1 propulsion and 2 support

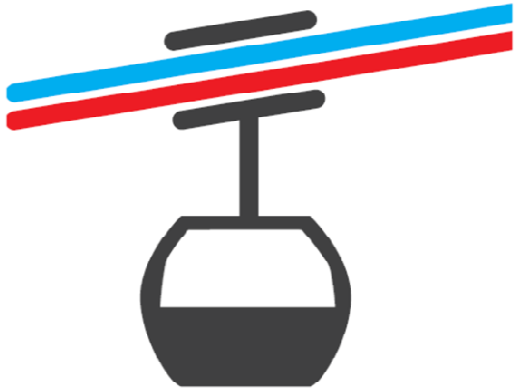
Technical Stats

- **# of Cables:** 3
- **Cabin:** up to 38
- **Grip:** Detachable
- **Max Wind Speed:** 100+ kph
- **Max Speed:** 27+ kph
- **Relative Cost:** High
- **Max Capacity:** Above 6,000 pphpd

Other common systems:

BICABLE DETACHABLE GONDOLA (BDG)

("*Cable Car Confidential*, 2013")



(2)
1 propulsion and 1 support

Technical Stats

- **# of Cables:** 2
- **Grip:** Detachable
- **Max Speed:** ~25 kph
- **Cabin:** up to 17
- **Max Wind Speed:** 70 kph
- **Relative Cost:** Low-med
- **Max Capacity:** up to 4000 pphpd

Other common systems:

MONOCABLE DETACHABLE GONDOLA (MDG)

(“*Cable Car Confidential*, 2013”)

1 cable for propulsion and support

Technical Stats

- **# of Cables:** 1
- **Grip:** Detachable
- **Max Speed:** ~22 kph
- **Cabin:** up to 15
- **Max Wind Speed:** 70 kph
- **Relative Cost:** Low
- **Max Capacity:** up to 4000 persons per hour per direction (pphpd)

For simplicity- we're going to use the term:

Gondola.

The specs:

Characteristics
&
Benefits

High Capacity Mass Transit

Transports *up to* 4,000 - 6,000 passengers / hour, / direction (pphpd)

5,000 pphpd system equivalent to more than 2,000 private vehicles, or 100 buses

And scalable downward to fit demand / budget

Fast and Efficient Transit

Max & avg speed roughly same -

other modes make frequent stops, wait at stations, impacted by traffic signals, congestion, road construction

Fast and Efficient Transit

Detachable grip technology:

gondola cabins slow down or stop
at stations without affecting the flow of the entire system

Fast and Efficient Transit

Avg speeds between 21 - 29 km/h

Travel a direct line, shortest distance between stations

Whyte - Downtown in 5 - 7 mins

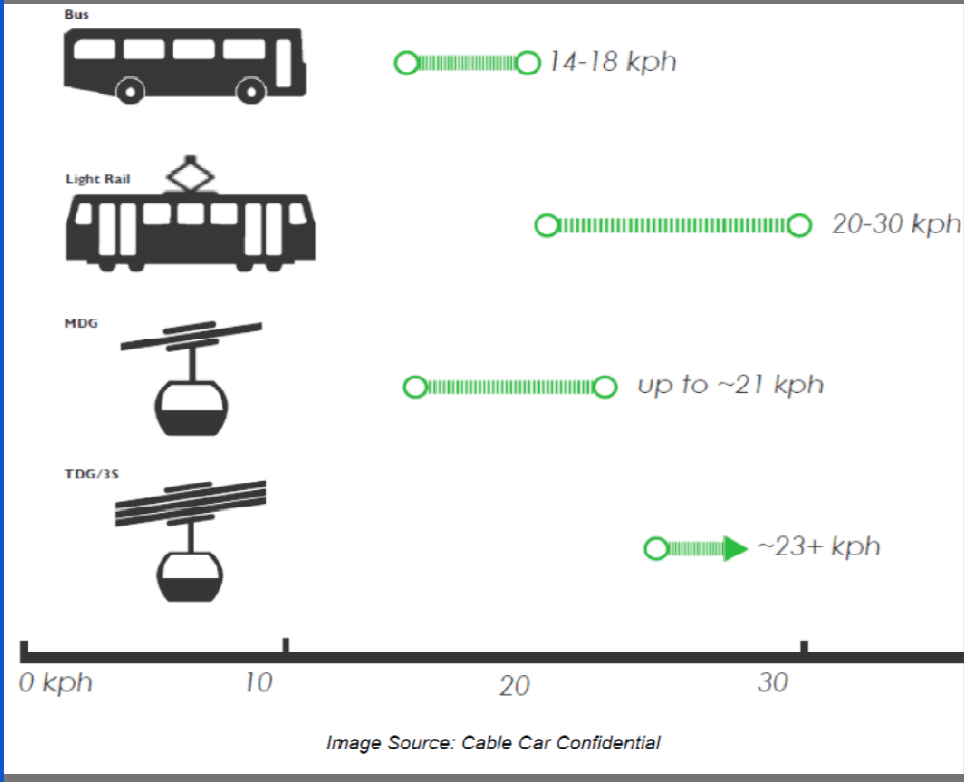


Image Source: Cable Car Confidential

Environmentally Friendly

Low power consumption among transit modes-

energy per person/km lower than electric buses, streetcars due to the ratio of passengers to weight

High Reliability Transportation

Uptime is extremely high, ranging from 99.3% to 99.9%

Interview with GM of Portland's Aerial Tram:

only 17 minutes downtime
in 2017
over 560,000 trips

That's better than an (edmonton) escalator

Negligible Impact on Traffic

Add capacity without contributing to road congestion

Modular and prefab design means minimal impact during short construction phase (12 - 18 mos)

Minimal waiting times for passengers

No schedules or timetables

Minimal & predictable wait times -

passengers can always see the next cabin coming.

Barrier - free mobility for all

Level platform access accommodates all mobility aids (wheelchairs, scooters, etc.)

Access for baby strollers, bicycles, and luggage

Safe Mode of Mass Transportation

Operate in extreme weather conditions: wind speeds upwards of 100 km/h

Equipped with security cameras as well as comms systems that are monitored

Safe Mode of Mass Transportation

Cabin recovery allows safe return to stations with no need for on-line evacuation

Multiple cars = choices:

passengers select a car they are comfortable on

Rapid Construction

Most systems: 12 - 18 mos

Pre-fab / modular

Stations and support pilings are the major components

Minimalist Footprint

Compact stations

+

Individual support columns

=

Limited land requirement / impact

Least intrusive infrastructure to span the river valley

Customizable cabin size to suit ridership

Most gondolas have between 4 - 28 seats

additional room for standing

Just add more cabins when / as needed up to system max

Secondary benefit: Tourism

Major draw for locals, visitors, tourists

Spectacular, unobstructed views of the river valley

High Level Bridge Streetcar ranks 4 / 194 things to do in Edmonton on Tripadvisor

The specs:

Limitations & Drawbacks

Max speeds / Distance

Avg speeds similar to other modes of transit;
max speeds are lower

Systems are ideal for shorter distances in dense urban environments

Complementary to a city's transit system

Susceptible to 100 km/h+ Wind

Most operate only when wind speeds are less than 70-100 km/h depending on the design

Feasibility study should account for how frequently extreme winds occur through Edmonton's proposed route, and how much downtime is acceptable

Limited stops

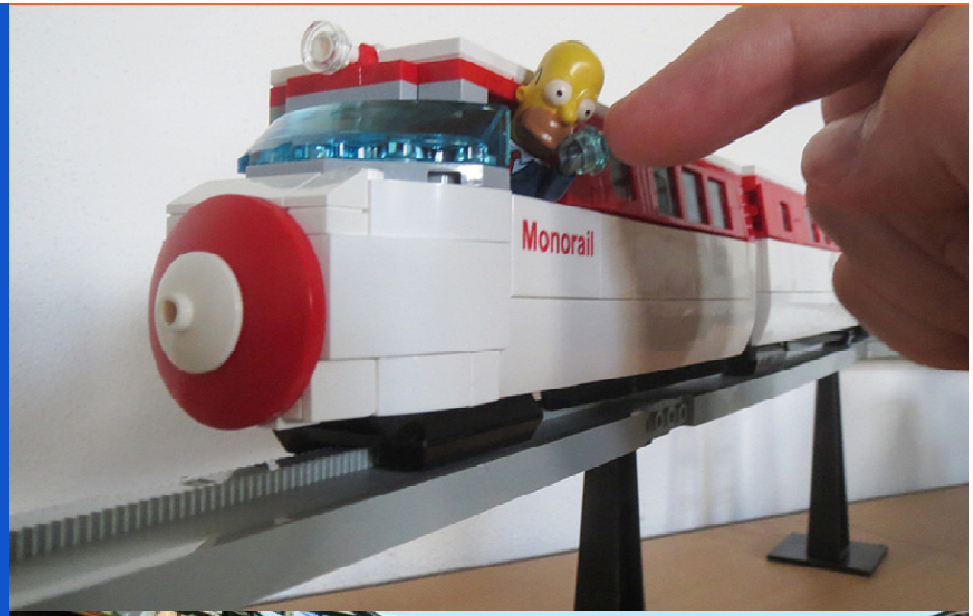
Stations cannot be placed too close to one another due to their cost

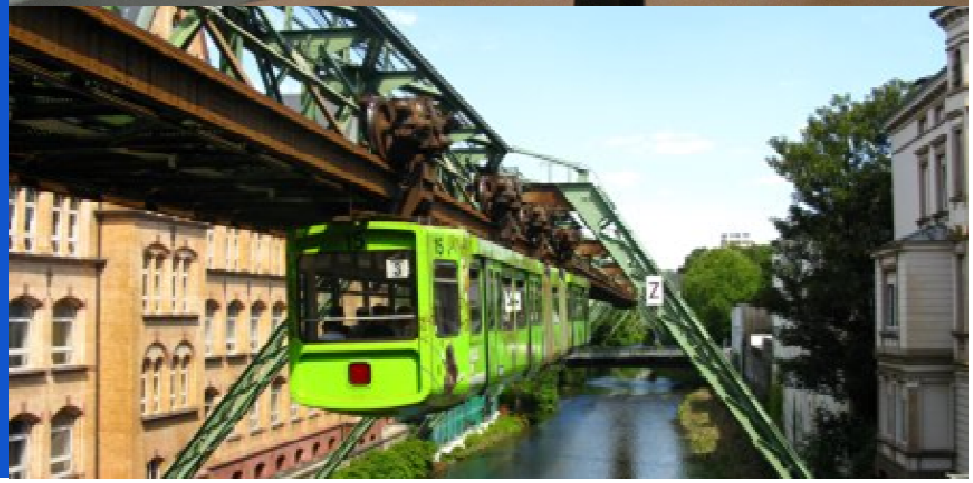
Station location should be carefully thought out to maximize ridership

Misinformation / public skepticism

Guaranteed to be subject to high degree of criticism and cynicism -

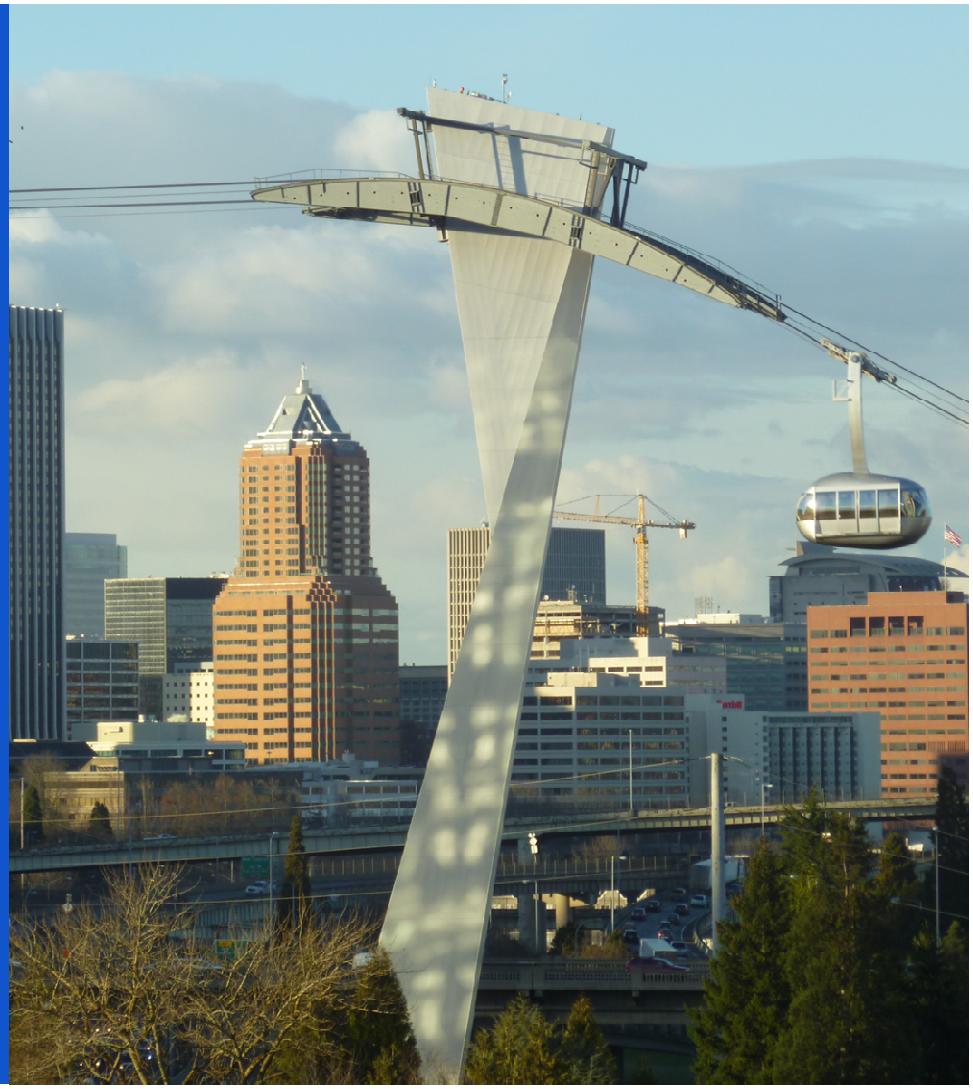
due to its novelty and lack of ubiquity among transit systems





Aesthetic impacts

Addition of infrastructure to a landscape



Proposed Route

Screening & Evaluation

In addition to the Proposed route, looked at 2 other proposals

Screening Criteria for Routes

Criteria	Route		
	Whyte Ave & Gateway to Downtown	University to Fort Edmonton /Valley Zoo	University to Bonnie Doon Mall
Challenged Topography (major elevation changes)	🟢	🟢	🔴
Difficult or Expensive to Service via Conventional Transit Modes	🔵	🔵	🔴
Limited Number of Discrete Destinations	🟢	🟢	🔴
High Passenger Volume Potential	🟢	🔴	🔵
Limited Impacts to Existing Development	🟢	🔵	🔴
Public Right-of-Way / Lands	🟢	🔵	🔵
Serves as Transit for Commuters	🟢	🔴	🔵
Potential for Tourism	🟢	🟢	🔵

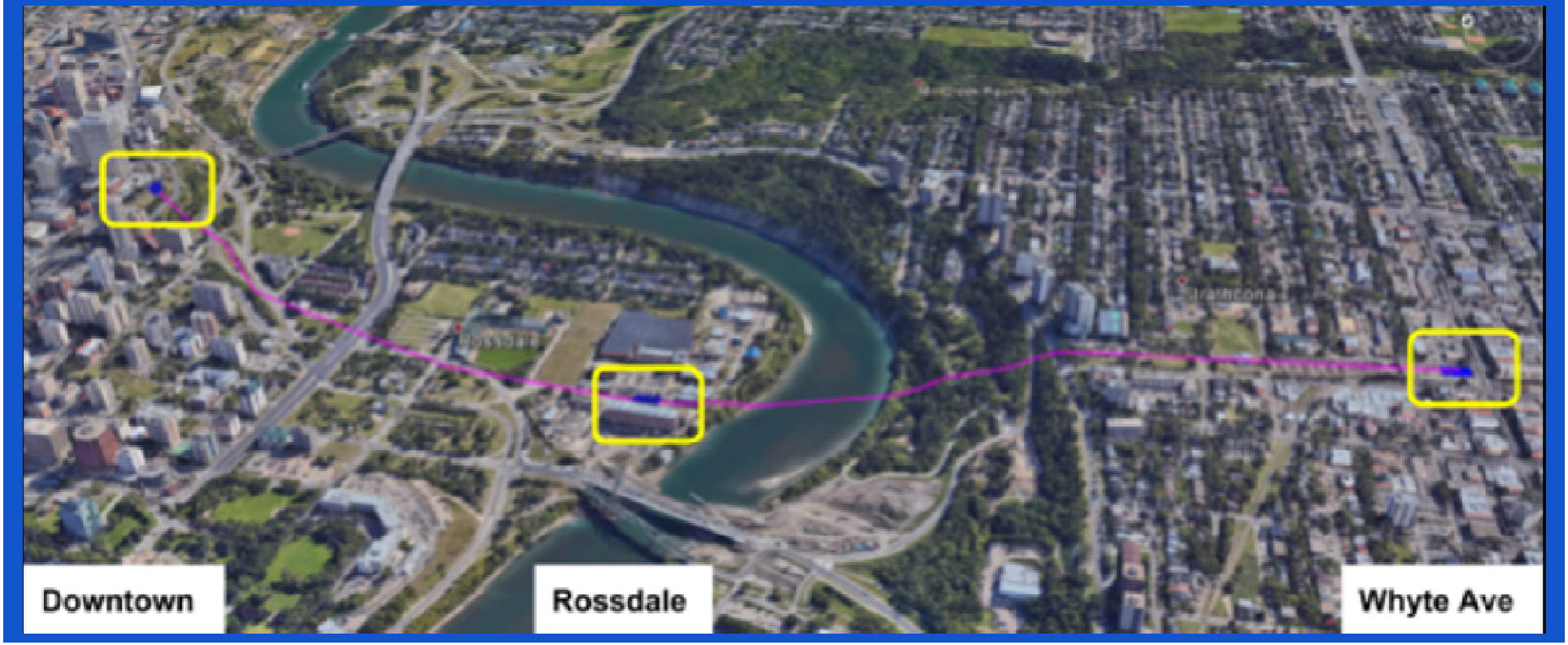
Legend

🟢 = Yes / Strong Potential

🔵 = Moderate

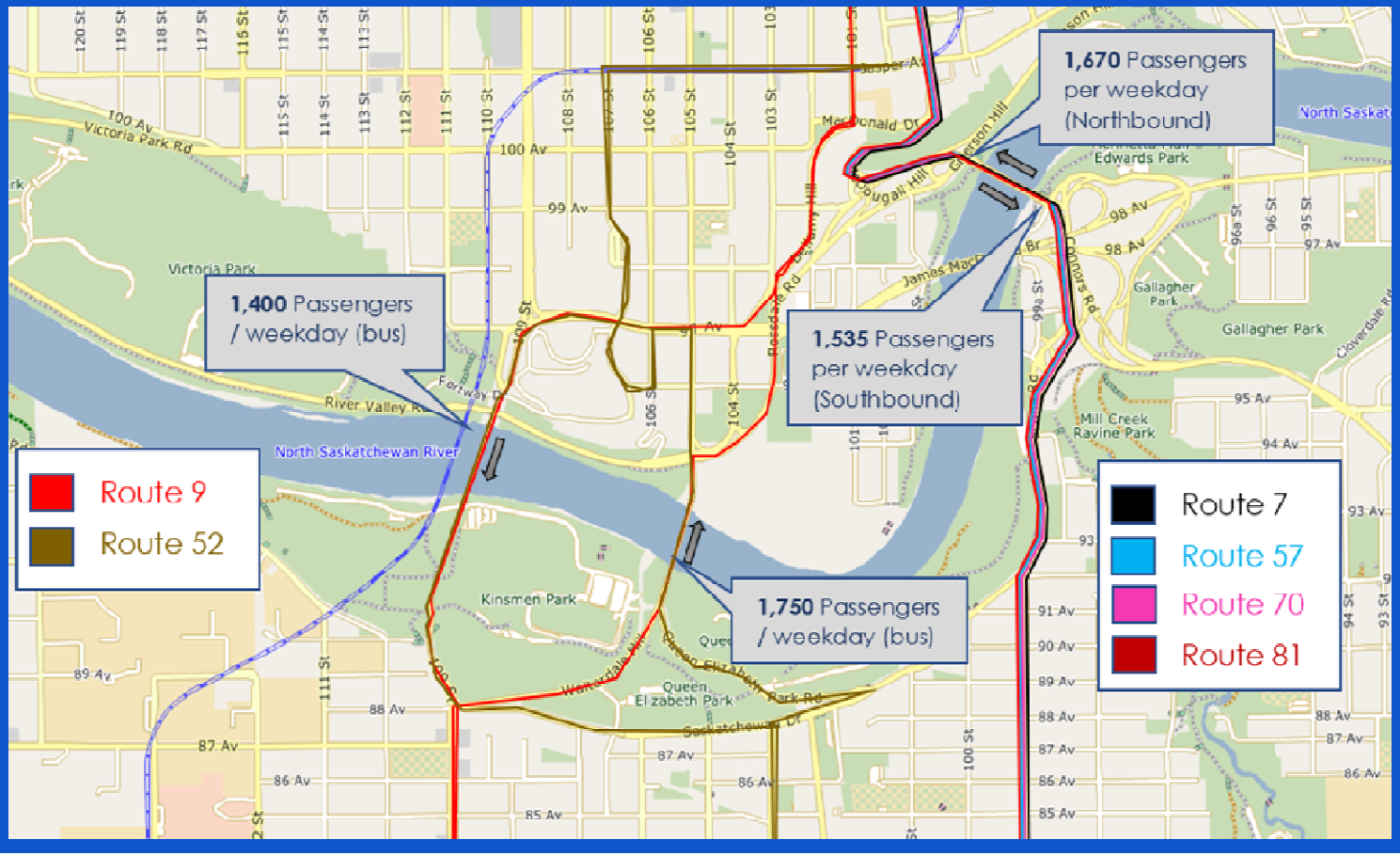
🔴 = No / Weak Potential

Proposed Route



Travel time comparisons

Ridership along route

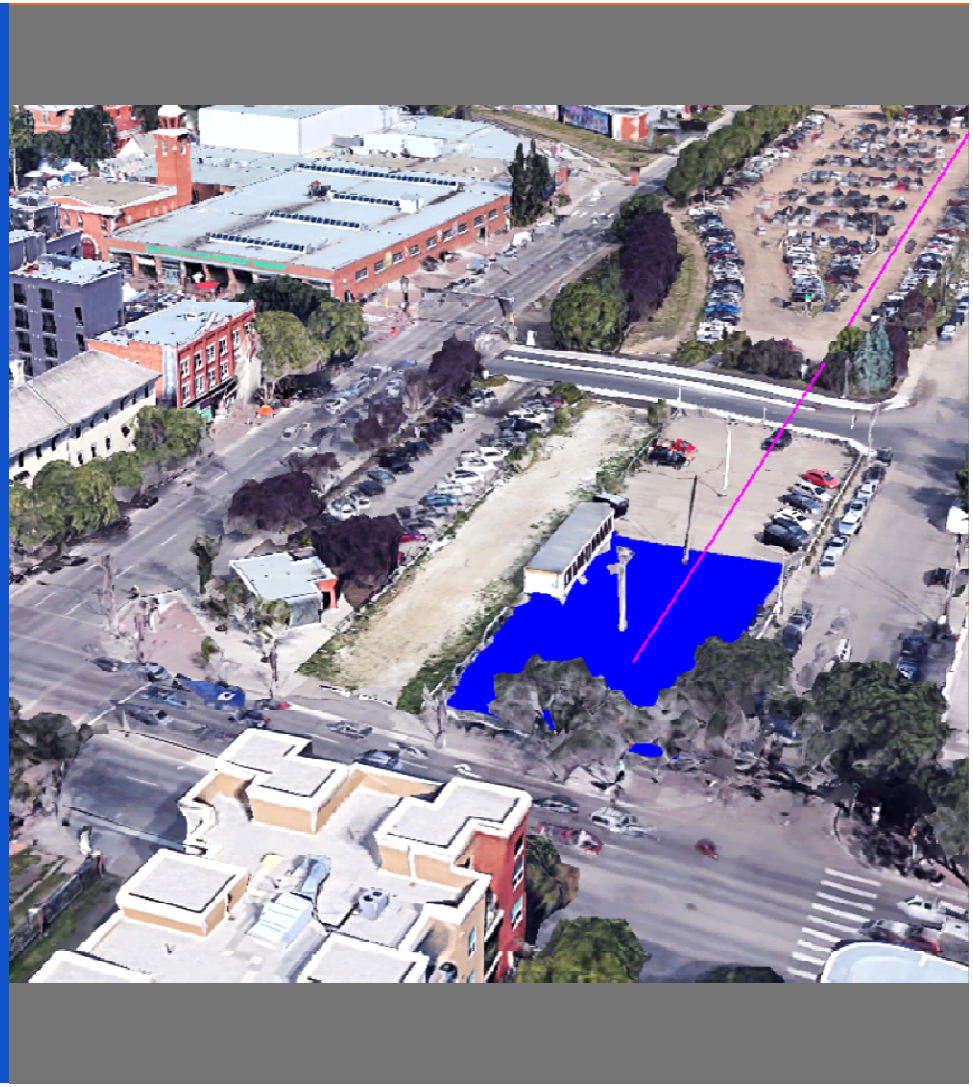


Proposed Stop: Whyte Avenue

Centre of Whyte Ave

Close to main attractions

Interchange to bus, future streetcar extension, future LRT



Proposed Stop: Rossdale

Future mixed-use cultural and entertainment hub?

Access to River Valley

Close but not intrusive to neighbourhood

Proposed Stop: McDougall Hill

Close to commercial core, Shaw Conference Centre, and The Quarters

Easy access to Central LRT via plaza & underground pedway, major bus stops

Case & Considerations

Capital costs

System	Length (Km)	Year built	Number of stations	Capacity pphpd	Daily Ridership	Annual Ridership	Construction cost	Fare (one-way)	Operating cost
Telluride (Colorado)	5	1996	4	900	7,000	2,600,000	$16,000,000	Free	$5.1M
Roosevelt island tram (New York)	1	1976 (rebuilt 2010)	2	1,000	6,400	2,400,000	$25,000,000	$2.75	$3.9M
Portland Aerial Tram (Oregon)	1	2007	2	980	3,800	1,350,000	$57,000,000	$4.55	$2.7M
Emirates Air Line (London)	1.1	2012	2	2,500	25,000	1,600,000	$90,000,000	$8.00	$9.4M offset by $10.6M in generated revenue
Medellin Line J (Columbia)	2.6	2008	4	3,000	15,000	5,000,000	$50,000,000	$1.00	N/A
Caracas Metrocable (Venezuela)	1.8	2010	5	1,500	5,000	2,800,000	$21,000,000	$1.00	N/A
Tlemcen (Algeria)	1.6	2009	3	1,500	6,000	5,000,000	$14,700,000	$1.00	N/A

Banff Long Term Transportation Study, Stantec (July 2016)

Revenues

ETS currently has farebox recovery around 40-45%

Many gondola systems are revenue positive:

cover both operating and maintenance costs

and generate profits

Emirates Air Line, London

Ridership numbers much lower than capacity (<10%) -

still revenue positive with fares exceeding operating costs

Also benefits from naming rights deal

Operating & Maintenance Costs

Increasing passenger capacity does not equal straight-line increase to operating costs

Base stations & personnel requirement mostly fixed

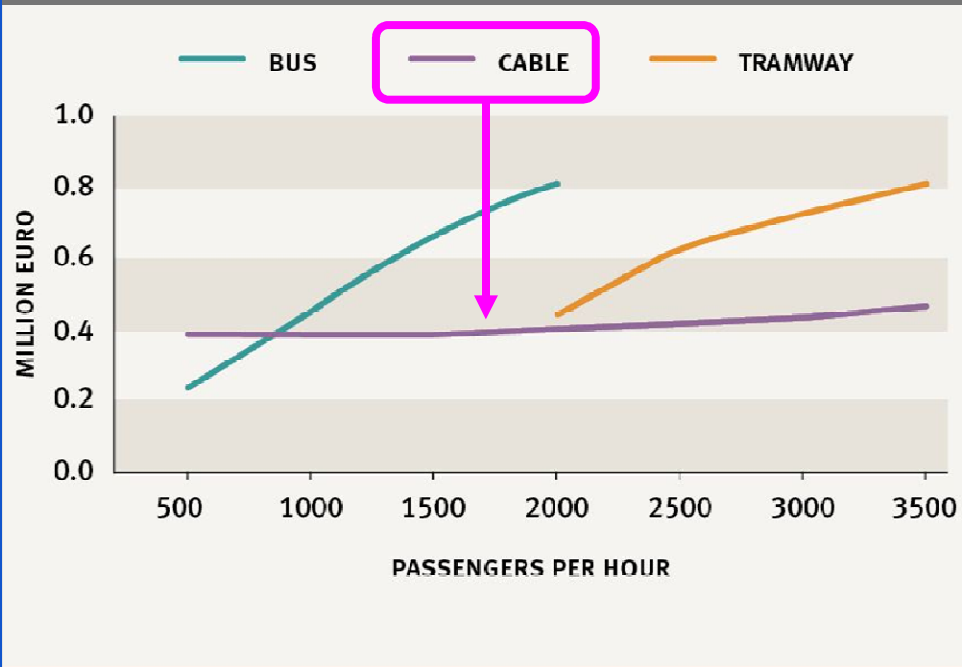


FIGURE 1 INDICATIVE COMPARATIVE COSTS BASED ON OPERATING COSTS OF BUS, TRAM AND ROPEWAY WITH HOURLY PATRONAGE IN GRENOBLE, FRANCE

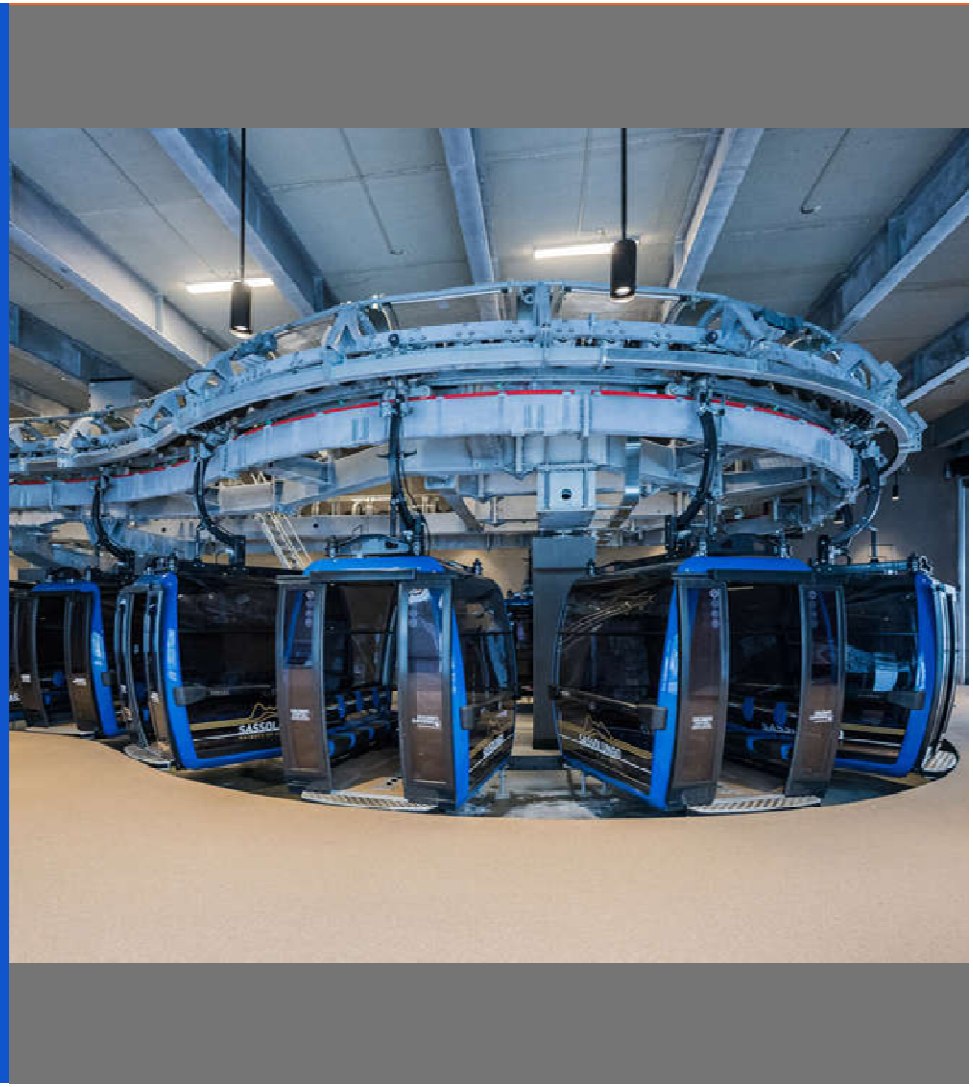
Steer Davies Gleave: Are cable cars a viable form of urban mass transit?

Operating & Maintenance Costs

No deadhead time

Maintenance performed on-site:

no large & expensive, land intensive buildings / garages to store and maintain the vehicles



Case studies

Portland Aerial Tramway - 2006

Connects south waterfront to Oregon Health and Science University

Trip time by bus: 25 mins

Time by cable: 3 mins

IGA Cable Car Berlin, Germany 2017

1.5 km
Built in less than 1 year
Cost €14 M ($21 M CAD)

Subway station located near one end - ties in to transit

Objections and concerns

Privacy

Selected route follows public rights-of-way, generous separations from homes

Smart Glass - auto-frosting being used on cable car systems

Weather

Select the system robust to local conditions

More advanced operate at high wind speeds

Genesis of systems is the most extreme winter conditions, in mountains

Competition with other modes ?

Complements a transport **network**

"From day one there were bikes everywhere… The demand surprised even me."

- Art Pearce,
PBOT manager of policy, planning, and projects

via BikePortland.org

Recommendation

That Administration, in consultation with key stakeholders conduct a study to explore the high-level feasibility and benefits of building an urban gondola as an alternative or complementary solution to other transport options across and into the river valley that is fully-integrated into our public transit system, and the communities it would serve.

Thank you!

For helping to expand the discussion about
public transport opportunities