From: Bemis, Shane [mailto:Shane.Bemis@greshamoregon.gov]
Sent: Wednesday, September 28, 2016 6:19 PM
To: Shirley Craddick; Bob Stacey
Cc: Kelly, Katherine; sean.files@multco.us; Diane McKeel; Harper, Jessica; Chambers, Eric; Bemis, Shane; Stegmann, Lori
Subject: Powell-Division BRT Route Vote

Dear Councilors Craddick and Stacey,

We are writing to strongly request that the Bus Rapid Transit Steering Committee vote regarding the proposed route, currently scheduled for Monday, October 3, be postponed in order to give interested parties an adequate opportunity to consider options. The current proposal, to establish the eastern terminus at the Gresham Central Transit Center instead of Mount Hood Community College, came about very suddenly, runs counter to all of the planning work that has been conducted to-date, and would remove one of the most important priorities for East County from the proposed project.

As stated during this past Monday's meeting, there has not been adequate information about financial analysis including cost breakdown and potential for re-scoping along the entire corridor, not just the segment from Gresham Transit Center to MHCC. The timeliness of information delivered about key components of the project has been disappointing. Additional time will enable the parties involved in this project to take a full look at the situation and determine the best course of action, based upon the best information possible.

This analysis is a critical part of the process if the agencies hope to achieve buy-in from the stakeholders, and ultimately the community. Thank you for your service, and for your time and attention to this matter. It is critical that we pause, analyze all of the information available, and make prudent decisions, absent unnecessary haste, based upon rational analysis and the community's priorities.

Sincerely,

Shane T. Bemis
Mayor

Diane McKeel
Multnomah County Commissioner

Bcc: Powell-Division BRT Steering Committee

October 5, 2016

FROM:
Board of Directors
Mt. Hood Community College

TO:
Steering Committee
Powell-Division Transit & Development Project
ATTN: Co-Chairs Councilors Bob Stacey and Shirley Craddick

REGARDING:
Honoring Original Project Goals, MHCC Route Inclusion

Dear Steering Committee and Project Leads,

Recently revealed suggested route changes to the Powell-Division transit project are causing great concern among residents and leaders in the Portland region. Project planners are indicating that Mt. Hood Community College will be eliminated from the route. This sudden pivot is enormously concerning, especially for low-income families in east Portland, and disproportionally people of color. Access to skills training, like that provided at MHCC, and economic opportunity, such as family-wage jobs at Legacy Mt. Hood Medical Center and the Gresham Vista Business Park, are crucial in fighting poverty and creating opportunity for those in our region who need it the most.

The abrupt departure from the long-planned terminus at MHCC is disturbing, because the newly proposed transit terminus at the Gresham Transit Center is just 2.5 miles short of the college. More than three decades ago transit planners included MHCC as the terminus for the MAX Blue Line light rail system but reversed course due to perceived funding gaps. That was a mistake then, and this is a mistake now. It would be an unfortunate repeat of history to leave communities of concern disconnected, yet again, from low-cost workforce training and other programs at MHCC.

It is incumbent upon Steering Committee members to evaluate this change and to understand the long-term implications. Short of adding the college back into the transit route, the only acceptable alternative is to have a firm commitment from TriMet to enhance the frequency of Bus Line 20-Stark alongside other transit investments to serve the public transportation needs of MHCC students.

Respectfully Submitted,

The Mt. Hood Community College Board of Directors

OHSU

Portland State UNIVERSITY

October 7, 2016

Powell-Division Transit and Development
Steering Committee
C/O Metro
600 NE Grand Avenue
Portland, Oregon 97232-2736

Dear Steering Committee Members,

We are writing in support of the Powell-Division Bus Rapid Transit (BRT) Project and an alignment that utilizes the Tilikum Crossing. This is an important project to both Oregon Health & Science University (OHSU) and Portland State University (PSU). Many of OHSU's approximately 15,000 employees, 3,000 students and 250,000 patients, as well as many of PSU's 29,000 students, 4,000 employees, and one million annual visitors live in east and southeast Portland. Further, OHSU and PSU have important partnerships with various community colleges, businesses and organizations in east Portland. This project has the potential to make significant transit improvements in the region and could impact travel behavior at these large institutions.

As you know, both OHSU and PSU strongly encourage transit usage and both have robust travel demand management programs (reduced-rate transit passes for employees and students, various programs promoting bicycle transportation). These programs help keep thousands of vehicles off the road each day. The Powell-Division BRT line utilizing the Tilikum Crossing would provide improved direct access to our universities, hospitals and clinics.

OHSU and PSU are located in the southern portion of Portland's Central City with few direct transit connections to East Multnomah County residents. The selection of the Tilikum Crossing BRT alignment would rectify this situation, providing this community with convenient access to OHSU and PSU and the rest of the Central City. Nearly one mile of transit infrastructure (Tilikum Crossing, dedicated lanes, transit viaduct and stations that can accommodate BRT buses) is already in place, directly connecting our institutions. As congestion in the city grows, the transit time savings from dedicated transit infrastructure will become increasingly important. The selection of the Hawthorne Bridge BRT alignment would require significant out-of-direction travel for many of the line's riders, add delay and require transfers to access our campuses. The Tilikum alignment provides better transit service now and in the future, without sacrificing other important project elements.

We urge you to support the Powell-Division Project with the Tilikum alignment, and in doing so, help make our educational offerings, healthcare services and career opportunities more accessible to East County residents.

Brian Newman
Oregon Health & Science University
Associate Vice President of Campus Planning, Development and Real Estate

Dan Zalkow
Portland State University
Associate Vice President for Planning, Construction and Real Estate

CITY OF
PORTLAND, OREGON
OFFICE OF PUBLIC SAFETY

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Leah Treat
Director, Bureau of Transportation
1120 SW 5th Ave, Suite 800
Portland, OR 97204
Office: (503) 823-5085
Email: leah.treat@portlandoregon.gov

October 3rd, 2016

RE: Portland's Considerations in Next Steps of the Powell-Division Transit and Development Project

Dear Councilors Stacey and Craddick,

As we move towards making our final decisions on the future of Powell-Division Transit and Development project, we wanted to echo the concerns we heard from steering committee and community members alike at our past Monday meeting. We would also like to share a few of the considerations we have in front of us as we work towards making these decisions. Our goal is to continue to be partners in this transit and development investment so that we can achieve a project that works for current and future riders in the corridor.

This past Monday was one of the most challenging steering committee meeting that we've had since the project launch three years ago. A few perspectives that we heard were:

- **Concerns about negative and inequitable impacts on traditionally underrepresented community members.** The loss of underlying service of the number 4 bus line was a significant concern for several groups, as were the potential negative impacts it would have on traditionally underrepresented households. The shortening of the route and the exclusion of Mt. Hood Community College as a station area also brought up equity concerns from community members that have felt forgotten and overlooked for several years.
- **Lack of capacity and resources for more pressing and crucial transit projects for the eastern portion of the region.** It was clearly articulated during the meeting by both staff and community that the project, in its current state, did not meet initial expectations of an

improved service for transit dependent riders from PSU/inner Powell to Outer Division/MHCC. There were also concerns expressed about east Portland/Gresham going to the end of the line for future RFFA funding, and should that happen, it would be a significantly negative impact on residents since the project is not directly be addressing the highest priority concerns.

- **Ambiguous Public Engagement Process.** The meeting also brought to light several questions from the steering committee around their role as either the "steering" or the "steered" committee. Use of technical language without data or definitions in addition to uncertainty of whether or not project is moving forward were notable concerns from steering committee members.

Recognizing these concerns is an important first step in moving forward with a successful program. As we work towards becoming better partners and more accountable leaders, we wanted to share our support and willingness to continue to advocate for the following:

1. More frequent service of the Line 20 bus, service to Mt. Hood Community College
2. More north/south connection and an overall better grid system on the outer eastside
3. More frequent service overall on the outer eastside

It is urgent to improve the overcapacity transit line that currently serves many transit dependent people in this area. The Line 4 is one of the highest ridership routes in the entire TriMet system, and is often late with less than 90% on-time performance. This is our chance to bring $100 million of federal money to an area that needs investment now. We see the potential use of the 1400 reallocated service hours from the existing Line 4 service as a means to address these priorities, and we continue to support the Powell-Division Transit and Development Project knowing that these issues are simultaneously being addressed.

While this project is Metro led, we fully recognize our own role in how it has progressed, in addition to our role in the generational concerns from eastside residents. That is why we are still committed to our contribution of $8.394 million dollars in Transportation SDCs for this project. With the recent passing of a local gas tax and our consistent efforts of advocating at the state and federal level for additional transportation dollars, we are committed to bringing more investments into this area.

We will continue to move forward with our partners at PDC, the Portland Housing Bureau and the Bureau of Planning & Sustainability to implement the Portland Local Action Plan's proposed housing and economic development investments along the Powell-Division corridor.

Please don't hesitate to contact us if you have any additional questions or concerns.

Sincerely,

Commissioner Novick

Director Treat

PORTLAND
BUSINESS ALLIANCE
Commerce · Community · Prosperity

October 11, 2016

The Honorable Tom Hughes
Metro
600 NE Grand Avenue
Portland, OR 97232

Neil McFarlane, General Manager
TriMet
1800 SW First Avenue, #300
Portland, OR 9721

Re: *Powell-Division Transit and Development Project*

Dear President Hughes and Mr. McFarlane:

The Portland Business Alliance (Alliance) appreciates the opportunity to comment on route options for the *Powell-Division Transit and Development Project*. The Alliance represents more than 1,850 small, medium, and large businesses in the Portland-metro area and is an advocate for improving the region's transportation infrastructure to help spur a prosperous economy. Transit is a critical component of our transportation system helping to get people to their jobs and providing residents with a good quality of life.

We appreciate the opportunity to comment on the preferred bus rapid transit (BRT) route option for the Powell-Division Transit and Development Project. We understand that the project no longer includes bus rapid transit on Powell Boulevard due to modeling that showed additional travel time and congestion making it unviable. The current proposed BRT line would run along Division and connect downtown Portland to Gresham.

We are not prepared to make a final recommendation on whether the BRT line should cross the Willamette River using the Hawthorne Bridge or the Tilikum Bridge due to insufficient information on the advantages and disadvantages of each. Instead, we strongly recommend that the Powell-Division Project Steering Committee consider the following factors before making a final decision on the appropriate bridge crossing:

- Travel Time & Reliability – The point of BRT is that it results in faster and more reliable travel times and should therefore be a major determining factor when deciding which bridge to use.
- Cost Differences – We understand that in order for the project to be competitive for federal funding it should not exceed $175 million. Cost differences should therefore be factored when evaluating the bridge options.

- Congestion – The likelihood for bottlenecks especially at bridgeheads and the adverse impact on other modes include freight and auto should be taken into account. In addition future traffic growth on each bridge itself should be taken into consideration.
- Capacity – The number of people likely to be served based on the different bridge crossings should be considered.
- Economic Development – The potential for real estate development and revitalization should be considered when determining which bridge to use.

The above factors should be assessed as a whole. In other words, one factor should not outweigh the importance of another factor when evaluating which bridge to use. Additionally, we were dismayed to learn that future traffic impacts from the Multnomah County Courthouse that is to be built at the Hawthorne Bridgehead were not modeled by Metro. We urge that it be a part of the traffic impact analysis and modeling when determining which bridge to use for the BRT line.

With such factors in mind, the *Powell-Division Transit and Development Project* will improve connections to employment and commercial centers and increase access to quality middle-income jobs, educational opportunities, and services for our region's residents.

Thank you for your consideration.

Sincerely,

Sandra McDonough
President & CEO

cc: Bernie Bottomly, TriMet
Malu Wilkinson, Metro
Noelle Dobson, Metro

From: Cammy Pierson [mailto:cammypierson@yahoo.com]
Sent: Monday, October 03, 2016 10:17 AM
To: PowellDivision
Subject: Re: Powell-Division: Sep 26 and Oct 3 Steering Committee meetings

Powell Division Steering Committee,

Dear committee and staff,

It has been an honor to serve on the steering committee and to see progress towards a much needed safer highway corridor. That being said, I still have concerns about the details of the design chosen, thus my email to you. Unfortunately, I am not in town, writing this from memory and unable to view details on line. I was unable to attend the meeting last week, but am hopeful I will be back in town by meeting time this evening. I am sending this email to you in the event I do not make it back in time.

With all due respect, the team has done a great job of coming up with several design plans, researching, discussing and ultimately determining which design best fits the needs of residents of our area. After many months of reviewing these options, I voted and agreed the one chosen seemed to be the best general design for the safety plan. Without adjusting the widths within this plan however, I do not see that the criteria is met for "improving all modes of traffic equally", thus not in compliance with requirements as stated for the safety plan.

The proposed width of the travel lanes does not improve vehicle traffic, but rather decreases the safety of vehicles. Those most significantly impacted would be emergency vehicles, freight of all types and sizes, delivery vehicles, busses (both school and public), service vehicles (both public and business) RV's of all types and sizes, and all towed vehicles. Many of these vehicles would have only inches on each side, creating "less safe" travel. For all vehicles "stopping", especially those towing, it also decreases the ability to safely stop within narrowed lanes.

The proposed travel lanes are a decrease for ODOT's standards of recommended safe vehicle lane width. At the same time, the proposed bike/ pedestrian/ sidewalks increase City of Portland standards from 6 to 8 feet.

Within the design chosen, I still maintain the sidewalk/ bike path/ planting strip can and should be each decreased each a few inches to allow for not decreasing travel lane width. It seemingly is an easy fix to a significant problem.

With the decreased travel lanes on Foster and the current 20,000 cars per day (and proposed increased volume on Powell), decreasing lane size would also contribute to an even greater east /west bottleneck of traffic.

I hope to attend this evenings meeting. If I am unable to get back in time however, please consider this my testimony for the meeting.

Thank you!

Cammy

From: Adam Herstein [mailto:aherstein@gmail.com]
Sent: Tuesday, October 11, 2016 10:23 AM
To: PowellDivision
Subject: Project shortfalls and suggestions for improvement

As I understand it, the Powell-Division plan doesn't call for any dedicated bus lanes at all – even on outer Division which has plenty of excess room for them. Longer buses, nicer shelters, and stop closures (essentially express bus service) would definitely be a welcome improvement, but they are not BRT. Why Metro and TriMet are continuing to spend time and funds on this not-BRT project is beyond me. It is my opinion that if those agencies continue on their current path, that this project will be a massive failure and waste of taxpayer money, for a service that will not even improve current conditions.

Therefore, I and many others, have proposed starting over from scratch as a light rail project. ODOT doesn't want to lose car capacity on Powell? Then elevate the line. It's cheaper than a tunnel, and most of Powell is set to be zoned medium-density that will be able to support a rail line. Modern elevated lines are quiet and efficient (think Vancouver BC's SkyTrain, not the loud and clunky elevated trains of Chicago and New York). Rail would also provide redundancy in the MAX system by connecting to the Green Line, in case the Steel Bridge is ever out of commission. Powell has plenty of road width for an elevated line and there are no homes along the roadway that would be severely impacted by construction. And it may even have the added benefit of slowing down motor traffic.

I know a lot of time and planning has gone into this project, and I'd hate to see it not reach it's full potential. Light rail will offer far more benefits and fewer compromises than a watered-down BRT project. Light rail is worth the additional costs.

Thank you.

--
Adam Herstein
aherstein@gmail.com

DATE: October 16, 2016

TO: Councilor Shirley Craddick, Councilor Bob Stacey,
Project Manager Elizabeth Mros-O'Hara

FROM: Jim Howell, Doug Allen

SUBJECT: Powell-Division Project Recommendation

We have attached a recommendation for three modifications to the current plans for the Powell-Division Project. Please forward this material by email to the entire Steering Committee and appropriate staff, consisting of this memo, the written proposal, and the appendix to the proposal.

This recommendation does not relate to the upcoming alignment and endpoint decisions, but to the later decisions about stop-spacing, frequency, and vehicles. We are supportive of proceeding expeditiously toward an LPA decision that incorporates our recommendations, which we do not think should delay that decision.

TriMet is rightfully under scrutiny for recent lack of ridership growth, and we think it would be irresponsible not to do everything possible to make the Powell-Division Project a real success story in increasing transit ridership.

Our recommendations are based on decades of professional transit experience, and based on our experience, our recommendation will draw twice the ridership of the current operating plan.

We would be pleased to meet with staff and the Steering Committee to answer any questions about our proposal.

Sincerely,

Doug Allen
dougallen@centurylink.net

Jim Howell
jimhowell89@hotmail.com

A Superior Division BRT Plan for the 21st Century

Summary of Proposal

The following three modifications to current plans for BRT service on Division will produce the best project, with the highest ridership and best service to passengers and potential passengers.

1. Use an all-electric fleet of buses.
2. Provide service at 10-minute intervals rather than every 15 minutes.
3. Serve all existing stops.

Electric vs Diesel

The Powell-Division Transit and Development Project should be an all-electric BRT project. The decision was made over two years ago to use 60-foot articulated diesel buses. Meanwhile, electric battery powered bus technology has improved to the point where full sized transit buses are no longer experimental oddities but are being deployed in revenue service across North America. The cost of heavy duty lithium batteries for vehicles is plunging. The transit vehicle market may well shift completely to all-electric buses within the next decade.

By 2021, the year this project is scheduled to go into operation, the big diesel buses now under consideration will be dinosaurs.

Electric buses provide many opportunities to reduce costs. They are far simpler machines that have no internal combustion engines to maintain. Life cycle costs that include purchase and operating costs are projected to be lower than diesel buses for currently available electric buses.

A 40-foot battery electric bus and a 60-foot diesel articulated bus currently cost about the same to purchase. By 2021, competition in the electric bus and battery industry will drive down prices and lower maintenance and fuel costs (22 MPG-equivalent vs 3MPG), making electric far less expensive than diesel. During its years of service each bus could save many thousands of gallons of diesel fuel from being burned and prevent well over a thousand tons of greenhouse gases from being emitted into the atmosphere.

Station spacing and Frequency

The main goal of this project should be to increase transit ridership. Better reliability, speed, and frequency of service are the main ways to reach this goal.

Speed and reliability will be improved with a well-designed signal priority system, optimal positioning of stops relative to intersections, and related priority measures.

While the current proposal will also improve speed by eliminating many stops, it does not improve frequency and it degrades access by increasing distance between stops. The net effect would not promote increased ridership and could possibly discourage it.

To boost ridership, keep the existing station spacing (with minor adjustments to better-position stops) and upgrade the service to a 10-minute base headway. During periods of high demand (peak hours in the prime direction), add more buses to fill this need. In order to speed up service, some of these peak buses could be identified as express and stop at only the busiest stations.

During most of the day, at 10-minute frequency, many less-utilized stops will have no passengers waiting, so the bus will not stop and lose time.

All stations should be designed to easily accommodate 60' buses. Currently 60' electric buses are not readily available but in all likelihood will be in the future.

Detailed Background, Context, and Further Justification

The Powell-Division project has made significant recent progress:

1. The combined Powell-Division routing has been eliminated due to unfavorable travel time. 2. The eastern terminus at MHCC will likely be dropped in favor of Gresham Transit Center. 3. Funding constraints have been identified -- moving towards obtaining $100 million FTA money with $175 million project total capital budget. 4. TriMet intends to budget additional operating money for the entire BRT operating cost. 5. FTA requirements have been identified that are likely to result in a successful grant application.

Can we make the project better, and still receive FTA funding?

The answer is a definite YES.

The Fixing America's Surface Transportation Act (FAST), enacted on December 4, 2015, is the law that authorizes the FTA Capital Investment Grant program.

FTA rules for implementing FAST finally came out in June 2016, and are available on the FTA web site:
https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FAST_Updated_Interim_Policy_Guidance_June%20_2016.pdf

Chapter 2 covers the "Small Starts" program, which Powell-Division hopes to qualify for.

Under the definition in law, eligible Small Starts projects can include heavy rail, light rail, commuter rail, streetcars, trolleybus, bus rapid transit, and ferries. Small Starts grants can pay for fixed guideway projects (rail and separated BRT) and can also pay for "corridor based" BRT.

The Powell-Division Project will qualify as a "corridor based" BRT.

FAST defines a corridor based BRT project as [Section 5309(a)(3)] "a substantial investment in a defined corridor as demonstrated by features that emulate the services provided by rail fixed guideway public transportation systems including defined stations; traffic signal priority for public transportation vehicles; short headway bidirectional services for a substantial part of weekdays; and any other features the Secretary of USDOT may determine support a long-term corridor investment but the majority of which does not operate in a separated right-of-way dedicated for public transportation use during peak periods."

The FTA regulations implementing FAST state that "corridor based" BRT projects must contain the following elements:

(1) The route must have defined stations that comply with DOT standards for buildings and facilities under the Americans with Disabilities Act, offer shelter from the weather, and provide information on schedules and routes.

(2) The route must provide faster passenger travel times through congested intersections by using active signal priority in separated guideway if it exists, and either queue-jump lanes or active signal priority in non-separated guideway.

(3) The route must provide short headway, bidirectional service for at least a fourteen-hour span of service on weekdays. Short headway service on weekdays consists of either (a) fifteen-minute maximum headways throughout the day, or

(b) ten-minute maximum headways during peak periods and twenty-minute maximum headways at all other times.

(4) The provider must apply a separate and consistent brand identity to stations and vehicles.

Note that the "corridor BRT" regulations do not require or favor a particular vehicle size, stop spacing, or propulsion mode (e.g. diesel, natural gas, electricity, etc.). They definitely allow shorter headways (more frequent buses) than the maximums listed above.

How current plans and Electric BRT relate to FTA regulations:

The project has been developed to this point with assumptions that a) it would run with articulated buses; b) there would be fewer stops than the current Line 4 bus route; c) there would be essentially no increase in frequency of service; and d) staff have recommended no underlying local bus service be included.

These assumptions come from a desire to reduce peak hour operating costs with larger vehicles, speed up trips to both reduce costs and attract riders, avoid increasing day-base operating costs, and avoid the cost of additional local service.

The current plan has, at best, limited potential for increased ridership, because during large portions of the day there will be no improvement in frequency. By reducing the availability of stops, some existing riders will in fact be lost. The increased distance between stations will seriously harm some riders who will have difficulty or be unable to access more distant stops. It is possible that this project will actually reduce transit ridership in the corridor.

The Electric BRT plan reduces the wait between buses from 15 to 10 minutes, so the service would be much more attractive to riders, especially those who transfer between routes, such as from Line 72 (82nd Avenue) or the MAX Green line, to the BRT, or travel during the day base service period (when in fact the majority of rides are taken).

This service, while attracting considerably higher ridership, would meet all FTA requirements for "corridor based BRT", and would also have most of the advantages over the existing Line 4 diesel bus service that are anticipated from the assumed plan.

Signal priority would still provide a quicker and more reliable trip. Operating a captive fleet with terminals both in Downtown Portland and in Gresham, would provide reliability advantages over the existing Line 4, which is actually two routes, the 4-Division, and the 4-Fessenden. Current Line 4 trips do not depart downtown Portland reliably because they have traveled several miles in

congested traffic from their schedule recovery point in St. Johns. A faster and more reliable trip both attracts riders, and saves TriMet operating costs.

Operating an all-electric service is the environmentally positive approach, eliminating diesel particulate emissions, and reducing CO2 emissions. Electric buses are also quieter.

Such an all-electric fleet would be an attractive "brand" that would differentiate this service from existing bus service and attract choice riders, while still providing full operational integration with the rest of the bus system.

Because the current average trip length in the corridor is far less than the total corridor length, the additional travel time caused by serving additional local stops will not be particularly significant to most passengers, especially after stops are properly located relative to signals to allow buses to rapidly stop and resume travel without long unproductive waits. No doubt there is a certain amount of stop re-spacing that can also help speed travel without impairing reasonable access to stops.

Bus stops should be located so that they can be served, in the future, by electric articulated buses when they become readily available. However, in the meantime, stops can be provided with attractive, distinctive, and functional shelters at far less than a million dollars each. FTA regulations do not require gold-plated stops. ADA compliant shelters and shelter access, along with customer information, are what are required. They must be identified in a way consistent with the vehicles to show the brand identity of the operation, which in this proposal, should emphasize the electric, non-polluting nature of the service.

What are the cost implications?

More frequent buses will certainly increase labor costs, but will not likely increase fuel and maintenance costs. As described above, electric vehicles are cheaper to fuel and maintain. Although battery-powered buses with long range and fast charging are rather new, both overhead-powered and battery-powered electric buses have been used for many years, and their cost-savings are well-known.

Reduced maintenance requirements may make it possible to store some of the BRT fleet overnight at Cleveland Station in Gresham, saving money by reducing empty trips to the bus garage.

The upside is that the better frequency and shorter walks will likely produce double the ridership of the plan currently being proposed, so the actual cost per ride will be less. Transit planners consider that time spent walking to and waiting for a bus is felt to be much more burdensome by passengers than is time spent travelling on a bus. Ridership models always weigh walk time and wait time greater than on-bus time. Various United States studies tend to consider that

every minute of combined walking and waiting time is worth more than two minutes of on-bus time when people make the decision to use transit. It is not clear whether this approach has been applied to the current plan.

More stations will not necessarily cost more, if wise choices are made. The stations in the current plan are very expensive, and appear to be modeled after Vancouver, Washington's "Vine" BRT project. Raised sidewalks create a multitude of additional costs, as do fancy station structures.

A C-Tran Downtown "Vine" Station

The raised platform (11”) theoretically allows wheelchairs to board on the level at the front door without any mechanical ramp or bridge-plate. However the operator must carefully snug the front wheel up to a special 6” bumper in order to provide a small enough gap to meet ADA standards.

A platform above the standard 6” curb height requires a specialized curb and may require additional sidewalk width and handrails, increasing the cost and complexity of each station.

The boarding speed of wheelchairs from a standard 6” curb will be similar to an 11" platform if buses are equipped with bridge plates that can accommodate the 4-5” height differential between a standard 6” curb and a kneeling bus.

11-Inch Platform (unnecessary and expensive)

Station structures should be modular, so they can be sized to match the demand at the various stops, and can be constructed in a factory at much less cost than building on-site. Cheaper does not mean uglier or less practical. We can still have attractive shelter for waiting passengers, with appropriate information and a clear message to all that this is the clean, environmentally responsible transit service of the 21st century, using renewable fuel with no diesel emissions.

What about passenger capacity?

One selling point of the current proposal is that buses on the 4-Division route are overcrowded and often end up bypassing passengers because there is no room. Articulated buses are proposed as the solution. While additional scheduled buses on the 4 Line would improve the situation, a major problem is schedule reliability.

The farther buses travel in regular service, the more they tend to bunch and gap and deviate from schedule. TriMet saves operating cost by combining the 4-Divison with the 4-Fessenden bus through downtown Portland. The BRT will cut the route in half, automatically improving reliability, but with additional operating cost. Signal priority should further improve reliability, because a smart system can give an additional boost to buses behind schedule, and give less of an

advantage to buses ahead of schedule. These reliability advantages do not depend on the use of articulated buses.

But consider that the overcrowding problem happens most during the peak hours, while the majority of rides occur throughout the entire day outside of the peaks. We need to be careful not to devote an excess portion of transit subsidies to peak commuter travel, as if these trips are more valuable. (If their value is in reducing peak auto congestion, then perhaps motorists should consider chipping in to cover the cost.) Improving day-base headways will provide significantly more attractive and useful service to the various disadvantaged populations.

The greatest percentage increase in ridership from the Electric BRT proposal will likely occur off-peak. The reason is that this is when there is the greatest proportional improvement in service frequency.

This provides a further cost advantage to TriMet, because peak-hour service is the most costly to provide. Added peak-hour service may involve a single bus trip, preceded and followed by trips from and to the bus garage. Short work shifts and split shifts (two paid shifts per day, with unpaid time off in between) are undesirable and costly. The more we can boost day-base ridership relative to the peak, the cheaper it is to operate.

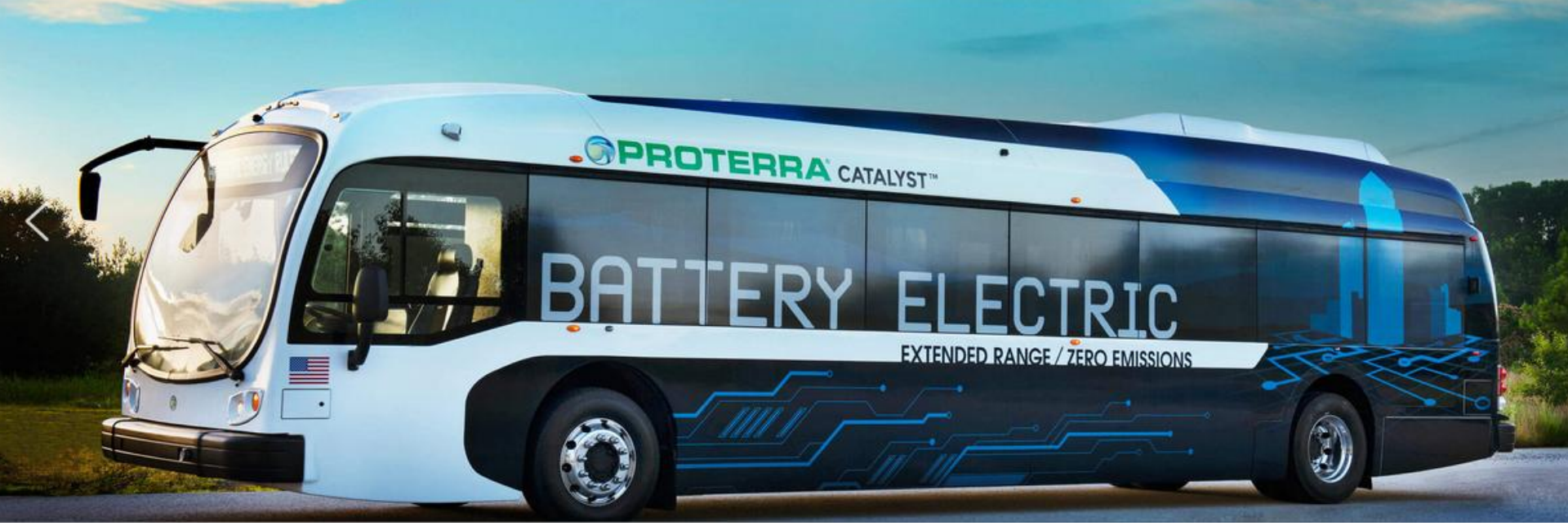
During the peaks, some of the electric buses could operate as express buses, stopping at only a few major stops. While this will not save a lot of running time, if an express bus is timed to enter the inner-Division portion of the route shortly ahead of a regularly scheduled bus, it may travel faster but still not catch up with the bus ahead of it. ("Express" can mean several things. Here, we mean limited stop service, not non-stop point-to-point service).

It is also likely that before ridership exceeds the capacity of the initial fleet, TriMet will be able to obtain electric articulated buses to add in the peaks, allowing greater peak capacity without increasing driver costs, but also without degrading service frequency.

Doug Allen
Jim Howell
10/16/2016

Division Street BRT

- **Electric vs Diesel Buses**
- **74 vs 33 Eastside Stations**
- **10 vs 15-minute Base Headway**



40’ All Electric Battery Buses

Electric BRT vs. Diesel BRT Capital Projects

	Electric BRT	Diesel BRT
Eastside Stations	74 – 60’-6” curbs, level platforms prefab shelters	33 – 120’-11” platforms, site built shelters
Downtown Stations	All existing #4 Bus Stops + 1 Mall + Union Sta.	3 – (2 integrated into existing +US)
Gresham Transit Center	Station Building with public restrooms and indoor waiting	“Branded” 120’ Station
MHCC	Campus Station, S.B. Bus Lane	New Crosswalk
Buses	38 - 40’ (70 cap.)	28 - 60’ (100 cap.)
Night storage ,fuel (charge) , clean and dispatch	Cleveland Station	Powell Garage

Electric BRT vs. Diesel BRT Operations

	Electric BRT	Diesel BRT
Signal Priority	Yes	Yes
Base Frequency	10-min 18-20 hrs.	15-min. (existing)
Peak hour/prime dir.	4-min (+9 trippers)	6-min (+6 trippers)
Peak hour capacity at Peak load point (River)	1,050	1,000
Bus station stops	As requested	All
Option for Limited Stop service	Yes	N/A

Union Station – Gresham TC Travel Times

	Existing	Diesel BRT*	Electric BRT*
Midday	60-min	54-min	55-min
Morning Peak Inbound	70-min	59-min	61-min
Evening Peak Outbound	74-min	63-min	65-min

* Assumes diesel BRT, with fewer stops and signal priority, is 10% faster than existing service during midday and 15% faster during peaks.

* Assumes Electric BRT is 2% slower than diesel BRT during midday and 3% slower during peaks due to more stops.

#4-Division Boarding Passengers

(Weekdays - Fall 2015)

Bus Stop	EB	WB	Total	Connecting Line
1. SE 82nd Ave	474	328	802	#72
2. Max Station	367	90	457	Green Line
3. SE 122nd	206	226	432	#73
4. Cesar Chavez Blvd	154	131	285	#75
5. SE 12th	162	109	271	#70
6. 162nd	73	181	254	None
7. SE 50th/52nd	128	122	250	#14, #71
8. 6th/Mad./Hawthorne	115	131	246	#6, Streetcar
9. SE 182nd	80	156	236	#87
10. SE 20th/Ladd	97	91	188	#10
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Top 10 Stops	1,856	1,565	3,421	(43% of total)
Total Boardings	3,043	4,989	8,029	(73 Eastside stops)