CITY OF VICTORIA

Committee of the Whole Report
For the Meeting of December 13, 2018

To:	Committee of the Whole	**Date:**	December 06, 2018
From:	Fraser Work, Director of Engineering and Public Works		
Subject:	Bicycle Network – Vancouver Street Design Considerations		

RECOMMENDATION

That Council:

1. Direct staff to report back in Q1 2019 following the completion of the Vancouver Street design engagement process, with a preferred design recommendation.

EXECUTIVE SUMMARY

The implementation of an All Ages and Abilities (AAA) cycling network is an important strategy for improving road safety and promoting more sustainable modes of transportation. Enhanced cycling infrastructure can reduce vulnerable road user injuries, supports reductions in greenhouse gas emissions, traffic congestion, parking demand, and contributes to providing more affordable transportation options. In addition to providing a higher standard of cycling and pedestrian safety, AAA network projects look to cost-effectively improve road safety conditions for all road users while ensuring motor vehicle traffic, transit and commercial operators, can effectively move in, out and throughout the City.

Vancouver Street (Park Boulevard to Bay Street) is proposed as the next AAA project and construction will mark the final corridor in the City's downtown bicycle network. Similar to portions of the Humboldt Street AAA corridor (east of Douglas Street), there is potential to implement shared-use AAA treatments in some segments of the Vancouver Street corridor.

This report outlines the rationale, and the design considerations and guidance used to explore options to reduce traffic volumes and speeds on portions of the Vancouver Street corridor.

There are numerous examples where traffic diversion and traffic calming treatments have been employed to lower traffic volumes and reduce traffic speeds. Staff assess that a combination of measures can be employed to reach the required volume and speed reductions, and create a safe, calmed, shared-use environment on the Vancouver Street corridor.

BACKGROUND

In 2015 the City of Victoria initiated the AAA cycling network project as part of Council's strategic objective to complete a multi-modal, active transportation network. Approved AAA infrastructure includes a combination of protected bike lanes on busy streets, shared-use bikeways on quieter

streets, and off-street pathways. The first phase of the AAA network focuses on the downtown network, to improve cycling safety in the urban centre, an area with greater risks to cyclists due to higher traffic and cyclist volumes. In addition to providing improved conditions for cyclists, these projects were also designed to support the ongoing safe and efficient movement of motor vehicle traffic, including transit, emergency and commercial vehicles. Overall, the AAA program aims to achieve a higher standard of cycling safety while better balancing the needs of all road users through a "complete street" design lens.

The City opened a two-way protected bike lane on Pandora Avenue in May 2017, followed in 2018 by a two-way protected bike lane on Fort Street, and a new AAA multi-use trail in Beacon Hill Park. In 2019, new AAA facilities are proposed to open on Wharf Street and on Humboldt Street.

In 2016, Council approved the AAA network and Phase 1 implementation for Cook Street, between Pakington Street and Pandora Avenue. As a part of the network development process in 2015/2016, Vancouver Street, Cook Street and Linden Avenue were also reviewed as candidates for potential north-south AAA routes. The Cook Street corridor was recommended in 2016, primarily due to its gentle topography and its direct connections to important destinations, including Dallas Road, Beacon Hill Park, Cook Street Village, and North Park Village.

In early 2018, further analysis of the Cook Street corridor revealed significant trade-offs would be required to maintain traffic performance and cycling safety at intersections, and especially for vehicle turning movements during peak times. Staff's detailed analysis and modelling indicated traffic impacts from cycle track designs could be mitigated by increasing dedicated vehicle space, but these changes imposed additional costs. Cycling safety (physical separation and dedicated intersection phases) remained challenging to balance with the desired traffic flow, road-space and geometry for transit and other users. Several iterations of design and road cross sections for different blocks were assessed to determine how to best balance traffic flow and cycling safety, which would come at the cost of pedestrian realm reductions, tree removals and utility and infrastructure conflicts. All of these impacts posed increasing costs to the project.

As compromises became more severe, staff reassessed the Vancouver Street option to determine if trade-offs would be less impactful and more affordable, even with the loss of the directness when compared to the Cook Street alignment

Staff concluded through additional analysis that Vancouver Street represented a more reasonable compromise between safety, cost and traffic performance, when compared to the Cook Street option sets. In May 2018, staff recommended progressing the Vancouver Street designs, including the necessary engagement process to ensure that public considerations are well understood, to reach detailed design and construction planning for a Vancouver Street AAA facility extending from Beacon Hill Park (and Dallas Road) to Bay Street.

At the May 2018 COTW meeting, Council directed staff to prioritize cycling improvements on the Vancouver Street corridor. In addition to this direction, Council approved the following motions:

1. Direct staff to report back on options of achieving a traffic volume average of approximately 1000 cars per day on Vancouver Street between Southgate and Fort Streets
2. That consideration be given to a calmed, shared use roadway for the portion of Vancouver north of Pandora.

ISSUES & ANALYSIS

Vancouver Street Existing Context/Conditions

The section of Vancouver Street AAA route currently being planned/designed extends from Bay Street to Park Boulevard. Future works will extend the corridor north to the municipal boundary, and south through Beacon Hill Park to Dallas Road. This corridor already represents one of the most desirable north/south cycling routes in the City, with current cyclist volumes of approximately 750 riders per day[1]. The route has been designated in the City's long term 2016 Bike Master Plan as a bikeway and AAA priority route, and in the Capital Regional District's Pedestrian & Cycling Master Plan.

Vancouver Street is classified as a Collector Street between Southgate Street and Pandora Avenue, and a Local Street between both Southgate Street and Park Boulevard, and Pandora Avenue and Bay Street. Vehicle volumes vary along the corridor, with its highest traffic volume along the downtown section (~8,700 vehicles/day), and intermediate volume in the area between Fort and Southgate Streets (~5500 vehicles/day), and low volume (<1500 vehicles/day) north of downtown and south of Southgate Street, where land use is primarily low-density residential, and existing traffic diversion installations already discourage non-local traffic.

Historic traffic speed trends along the corridor vary by location (see table below). The highest average speeds still remain below the posted limit, documented between Pandora Avenue and Caledonia Avenue, and between Fort Street and Southgate Street. Speed studies noted 85% of all traffic were measured travelling below 40kmh in the downtown core, and in the area south of Southgate Street.

Section	Street Classification	Average Daily Vehicles	85th Percentile Speed (kmh)
Bay Street to Pandora Avenue	Local	1200-1500	45-50
Pandora Avenue to Fort Street	Collector	8500-9000	<40
Fort Street to Southgate Street	Collector	5200-5700	45-50
Southgate Street to Park Boulevard	Local	1500	<40

The intended land use patterns identified in the Official Community Plan forecast increased growth in cycling on Vancouver Street. Urban Place Designations along the Vancouver Street corridor include Core Residential, Urban Residential, and Traditional Residential zones. Higher-density residential land uses are expected within the Core Residential area (generally, between Pembroke Street and Rockland Avenue).

Protected vs Shared AAA Facility Design Considerations

Cycling infrastructure design standards help determine what design treatments are most important to ensure safety and comfort to be suitable for riders of all ages. Fully protected bike lanes introduce physical barriers between cyclists and vehicle traffic to enhance safety, and are most appropriate when traffic volumes and/or speeds are higher. Shared facilities (i.e. where bikes are not separated by physical barriers) demand lower speeds and volumes to reduce the risk of collisions involving vulnerable road users. Research has found that both perceived and objectively assessed lower traffic speeds and lower traffic volumes are associated with higher likelihood of cycling for transportation, including attracting those who are "interested in cycling but concerned about safety" if they are sharing the roadway with higher volumes of faster moving vehicles.

[1] *Burdett and Vancouver – June 2018 count data City of Victoria.*

There are several sources of guidance for designing shared use cycling facilities. The National Association of City Transportation Officials (NACTO) provides contextual guidance for developing these types of AAA bikeways. Shared-use facilities may be appropriate where volumes are in the range of 1000-2000 vehicles per day. The City of Vancouver has a target volume of 500 vehicles/day for shared-use, with a maximum of 1000 vehicles/day The CROW Design Manual for Bicycle Traffic (Netherlands) recommends a range of 500-2000 vehicles/day, depending on route type, volume of cyclists, vehicle speed, and local context. The recommended target of 1500 vehicles/day for shared-use facilities in Victoria is within the range recommended/employed in other jurisdictions. The City has already applied this approach for the Humboldt Street corridor design, which is subjected to near 1500 vehicles/day (approximately 150-180 vehicles/hour at the busiest time of the day) and will have posted speeds of 30kmh.

Protected facilities are generally suitable for streets with higher volumes, speeds, or land uses that generate significant non-local vehicle circulation. Protected facilities typically are more expensive to construct, require more right-of-way space, and have to be balanced with other right of way uses.

Staff assess that a mix of protected and shared facilities will be appropriate for the Vancouver Street corridor. A shared-use design is assessed as suitable for north of Balmoral Road, and south of Fort Street. Achieving and maintaining the required speeds and volumes is achievable using intelligent design treatments to route and calm traffic using treatments that are already common to the City.

Traffic Calming Design Guidance

On local and collector streets like Vancouver Street, traffic calming installations are intended to reduce vehicular speeds, discourage shortcutting, minimize conflicts between street users, and improve the neighbourhood environment.

The Institute of Transportation Engineers identifies a number of standard road treatments to be used for traffic calming, including:

Vertical deflections, horizontal deflections, and roadway narrowing. These are intended to reduce speed and enhance the street environment for non-motorists, while maintaining existing traffic movements.

- Vertical deflections create a change in the height of the roadway that require a motorist to slow down to maintain an acceptable level of comfort.
- Horizontal deflections hinder the ability of a motorist to drive in a straight path. This shift reduces the ability of a motorist to maintain speed while comfortably navigating the roadway.
- Roadway narrowings reduce the width of a vehicle travel lane or roadway, requiring a motorist to slow down to maintain an acceptable level of comfort and safety. The measure can also reduce the distance required for pedestrian crossings, reducing exposure to potential conflicts.



Above: examples of traffic calming techniques used to slow vehicles and encourage safer shared spaces

Diagonal diverters, half closures, full closures, and median barriers. These are traffic diversion strategies intended to reduce non-local/cut-through traffic by eliminating traffic movements in one or more directions.



Above: examples of traffic diversion and no-through road techniques used to reduce non-local traffic

City Traffic Calming Examples

Directional diverters (right-in/right-out restrictions) installed at the Kings/Shelbourne and Kings/Richmond intersections in the Jubilee neighbourhood reduced daily volumes on Kings Road from 1000 vehicles/day to 400 vehicles/day, virtually eliminating non-local traffic on the street.

Above: Directional diverter - Kings/Shelbourne

Above: Directional diverter - Kings/Richmond

A diagonal diverter constructed at Blackwood/Kings eliminated cut-through/non-local traffic on local streets in the Hillside/Quadra neighbourhood. While permanent installations can include landscaping and other aesthetic improvements, temporary installations can be low-cost measures that achieve similar traffic results.

Above: Permanent diagonal diverter – Blackwood/Kings

Above: Temporary diagonal diverter – Reno/Belton

Traffic calming and speed reduction strategies have been successfully implemented in a number of Victoria neighbourhoods (including speed humps on Washington Avenue, chicanes on Leighton Road) over the past decade and in other cities, including Calgary, Edmonton, Vancouver and Halifax.

In Vancouver, Point Grey Road, a proposed cycling corridor with over 10000 vehicles per day, was reduced to less than 1000 vehicles/day following the installation of a road closure at MacDonald Street (see below). The road closure re-routed non-local traffic to nearby arterial streets, improving conditions on Point Grey Road for cyclists, while maintaining local traffic access.

Point Grey Road (Vancouver) – pre-construction (2009)

Point Grey Road/MacDonald (Vancouver) – post-construction (2015)

Research provides insights into the impact of traffic calming, and there are a number of studies that measure the effect of various traffic calming measures on user comfort, collision frequency and vehicle speeds. Mountain, Hirst, & Maher (2005) found that there was an average vehicle speed reduction of 13.5kmh with the use of vertical deflections, and 5.3kmh with the use of horizontal deflections. Drivers yielding to pedestrians on a raised crosswalk (a type of vertical deflection), increased from 13% compliance to 53% compliance (Watkins, 2000). The same study also concluded overall perception of road safety improved after traffic calming changes. Among

pedestrians, 57% of survey respondents felt better about road safety after diversion and speed interventions were installed. For cyclists and motorists, the rates were 33% and 46%, respectively.

US Federal Highway Administration and Institute of Transportation Engineering data indicates 35-45% volume reductions can be achieved through diagonal diverters, half- and full-closures, with 10-20% volume reductions with speed humps, narrowings, and chicanes. 15-25% speed reductions can be achieved with speed humps.[2]. A combination of measures can be employed to reach the required volume and speed reductions.

Achieving 1000-1500 Vehicles/Day between Southgate Street and Fort Street

Traffic on Vancouver Street between Southgate Street and Fort Street (~5500 vehicles/day) is currently comprised of local and non-local vehicles. Non-local drivers typically choose alternate routes to achieve time savings; physical measures that eliminate those time savings on Vancouver Street will encourage drivers to use Quadra Street or Cook Street. These parallel routes are designed/intended to move 18,000 or more vehicles per day, and have available capacity during all time periods to accommodate the planned traffic volumes redirected from Vancouver Street.

With non-local traffic removed, the Vancouver Street corridor will evolve into four or five neighbourhood segments delineated by traffic diversion treatments. The size of the segments would be linked to the targeted traffic volume threshold using land use trip generation rates. This would create a series of crescents/closed loop residential streets accessible only from Quadra Street and/or Cook Street, ensuring only local traffic accessing properties would be able to use that portion of the Vancouver Street corridor. To achieve the desired 30kmh traffic speeds, traffic calming measures would be implemented within those defined areas and lowered speed limits would be posted.

[2] FHWA/ITE: *Traffic Calming: State of Practice, pg. 106.*

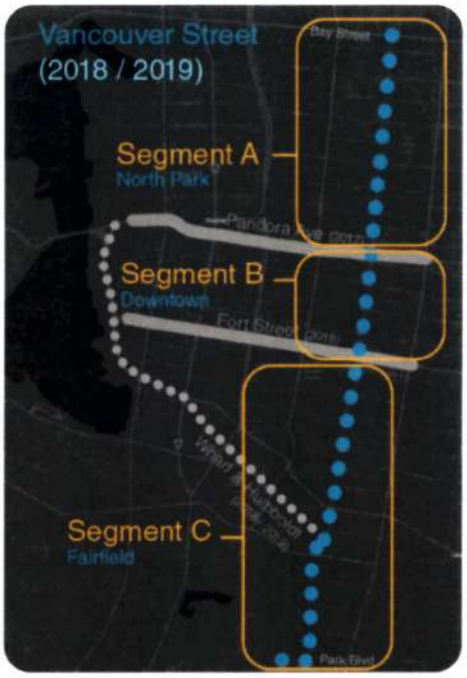
Vancouver Street – Potential locations for traffic diversion treatments

Local access to property within the area bounded by Fort Street, Cook Street, Southgate Street and Quadra Street would be impacted/limited by these interventions, in exchange for reduced volumes and speeds, and a safer, calmed public realm for all road users on Vancouver Street.

Vancouver Street Corridor Conceptual Design

Overall, staff differentiate between sections of the Vancouver Street corridor as three distinct segments, reflecting the zones of different land uses and traffic volumes. Staff assess that traffic calming and shared streets would maintain AAA status in areas north and south of the downtown core (Segments A and C), while protected bike facilities would be required due to traffic and speed volumes in the downtown core (segment B).

Segment Design



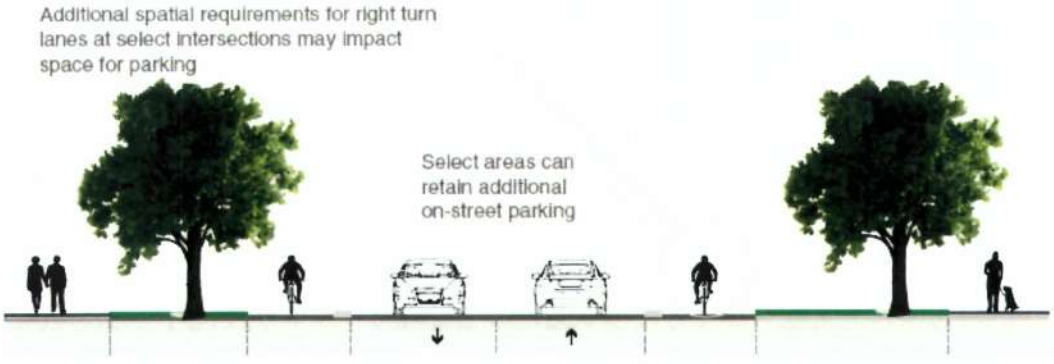
Segment A

Continued public consultation activities and the detailed design process will inform what specific types of traffic diversion and speed interventions will be most suitable and supported by the community for Segment A. A combination of traffic diverters and traffic calming measures are required to achieve the performance targets for a AAA facility.

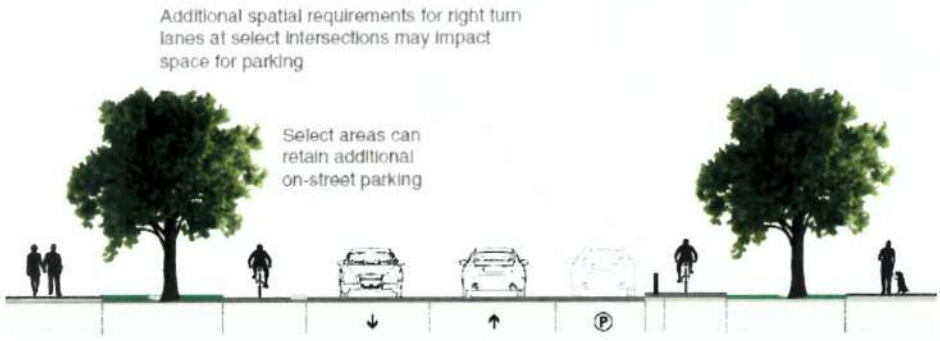
Traffic diverters could be similar to the temporary or permanent examples shown above, primarily impacting traffic volumes (with some speed attenuation). Traffic calming measures that impact vehicle speeds in these segments will be a combination of measures shown above, based on feedback received through the public consultation process.

Segment B

In Segment B, protected bike lanes are more suitable to accommodate the traffic volumes generated by the higher densities and diverse land uses. Given the anticipated vehicle traffic generated from the mixed-use development site at 1002 Pandora Avenue and future development considerations for the area, staff are recommending extending the protected bike lanes design north of Pandora Avenue, to Balmoral Road. Two options are currently being explored in this segment of Vancouver Street, balancing the various demands for public space:



Option A – predominantly within existing pavement width. Parking would be removed from most of the segment, with no impacts to existing boulevard trees and green space.



Option B – Boulevard space would be utilized to retain the majority of on-street parking, where appropriate. Curb realignment to retain parking would not eliminate boulevard trees, but would reduce the amount of greenspace in the boulevard.

Segment C

Continued public consultation activities and the detailed design process will inform what specific types of traffic diversion and speed interventions may be suitable and supported by the community for Segment A. A combination of traffic diverters and traffic calming measures are required to achieve the performance targets for a AAA facility.

Traffic diverters could be similar to the temporary or permanent examples shown above, primarily impacting traffic volumes (with some speed attenuation). Traffic calming measures that impact vehicle speeds in these segments will be a combination of measures shown above, based on feedback received through the public consultation process.

While shared-use AAA routes provide improved safety for those cycling, they can also create a more pleasant street for pedestrians and residents. Interventions can improve overall road safety, offer opportunities for new public spaces, maintain or add to on-street parking supply, reduce ambient noise levels, and provide local access to residences, businesses and services.

The City would measure the efficacy of any traffic calming/diversion treatments used on these segments of Vancouver Street by collecting vehicle speed and volume data, post-construction. Pedestrian and cycling volumes would also be measured before and after project implementation, along with qualitative feedback from stakeholders and users on the corridor. If required, additional interventions could be made to achieve the desired volume and speed performance targets for the street.

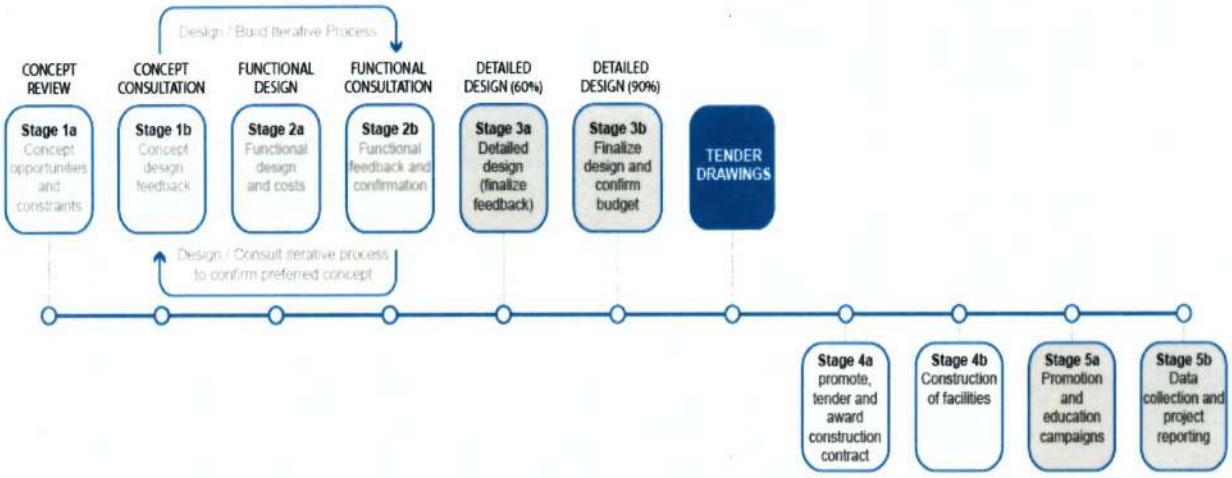
Continued public consultation activities and the detailed design process will inform what specific types of traffic diversion and speed interventions may be suitable and supported by the community for Segments A and C on the Vancouver Street project.

Summary - Traffic Calming Potential

There are numerous examples, locally and further afield, where traffic diversion and traffic calming treatments have been employed to lower traffic volumes and reduce traffic speeds. Implementing a combination of traffic diversion and traffic calming treatments will create a safe, calmed shared-use environment on Vancouver Street between Fort Street and Park Boulevard, and between Balmoral Road and Bay Street. Fully protected bike facilities through the downtown core will connect these two shared-use segments, providing a higher standard of cycling and pedestrian safety on the Vancouver Street corridor, while ensuring motor vehicle traffic, transit and commercial operators, can effectively move throughout this area of the City.

Engagement Activities

The City of Victoria continues to use a multi-phased approach to community engagement for major pedestrian and cycling infrastructure projects.



In August and September 2018 staff met with Community Associations and agency partners (Victoria Police, BC Transit and ICBC). In November 2018 the City held public engagement and stakeholder outreach sessions to gather feedback on issues, observations and ideas for the corridor from the general public.

NEXT STEPS

Engagement activities will continue in January 2019 and will include design focus groups with youth from Christ Church Cathedral School, and clients and staff at the Inter-Cultural Association of Greater Victoria. A design will be presented to the public in early February to gather feedback and will include specific locations and treatment recommendations required to achieve the performance targets of 1,500 vehicles/day and 30kmh speeds on Segments A and C, and the preferred approach for protected bike lanes on Segment B.

Feedback collected from these efforts, including walking tours, on-line survey data, information station comments, stakeholder meetings and public open house events, will inform a functional concept in early 2019.

Staff will then complete a third round of public engagement, and present designs to the City's Accessibility Working Group and the Active Transportation Advisory Committee, prior to bringing forward a preferred design and project budget to Council in late Q1 2019.

CONCLUSION

Cycling infrastructure design standards help determine what design treatments are most important to ensure safety and comfort to be suitable for riders of all ages. Fully protected bike lanes introduce physical barriers between cyclists and vehicle traffic to enhance safety, and are most appropriate when traffic volumes and/or speeds are higher. Shared facilities (i.e. where bikes are not separated by physical barriers) demand lower speeds and volumes to reduce the risk of collisions involving vulnerable road users.

Achieving desired traffic volume and speeds on segments of Vancouver Street between Fort Street and Park Boulevard, and north of Balmoral Road can be accomplished through a number of traffic calming and speed reduction interventions, treatments already common to the City.

A multi-phased approach to community engagement for major pedestrian and cycling infrastructure projects is underway for this project. Engagement activities will continue in early 2019, and the preferred design and project budget will be presented to Council in late Q1 2019.

Respectfully submitted,

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Report accepted and recommended by the City Manager: Jocelyn Jenkyns

Date: Dec 7, 2018