National Association of
City Transportation Officials

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NACTO's 5/24/18 Webinar – Unanswered Questions
"Fire Trucks and Vision Zero"

Thank you for tuning in to our webinar! As we were not able to answer all your questions during the event, we have compiled responses to all unanswered questions. If you have any further questions, comments, or concerns, do not hesitate to reach out to events@nacto.org.

Questions for Portland

1. Does Chief Meyers have suggestions for how to deal with firefighters who are more concerned with building wider roads for outrigger deployment than reducing crossing distances for pedestrian safety?
    a. *In our case we have adopted a community risk reduction plan focusing on vibrancy/livability as a core solution to fire risk. We have had to educate the organization about why pedestrian enhancements and SMART cities are the key to reducing call volume (an issue facing every urban fire department). However, we also involve firefighters, officers and chiefs in discussions surrounding the best plan for apparatus placement options during a street design project. It is important to include them in the conversation as they will be the individuals adapting to the result.*

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    Many PF&R members live in the City of Portland and have a vested interest in maintaining livability in the communities in which they live. It is forecasted that the population in the metropolitan area of Portland could increase nearly 20% in the next 20-years which would add over 130,000 new occupants. Street design planning to provide alternatives to driving such as bicycle greenways, protected bike lanes, enhanced crosswalks, diverters, roundabouts, extended curbing etc. are vital to preventing complete failure (i.e. gridlock) of the street infrastructure. It is in the best interest of all city employees to support comprehensive plans that reduce dependency on single occupant vehicles. Providing a safe means for bicycles and pedestrians to commute and travel throughout the city is a key solution to reducing future congestion.

    Portland has also adopted a strategy to reduce greenhouse gas emissions and increase bicycle and pedestrian travel is an important solution to the pollution problem. Assisting citizens to safely walk, bike and/or use light rail for a variety of trip lengths means fewer vehicles emitting pollution.

    PF&R and City of Portland has always had portions of the City where full deployment of aerial ladder trucks is restricted. PF&R Firefighters are trained in techniques to overcome these challenges such as short jacking outrigger deployment, ground ladder alternatives coupled with pre-fire familiarization of these specific restricted access locations.

2. I am really interested in Chief Myers comment that vibrant cities don't burn; was there some reference material to support this?
    a. *We have contracted with Dr. Jon Jay from the Chan School of Public Health at Harvard to assist us in proving that vibrant cities don't burn. There is already a great deal of proof that health disparities are often linked to where a person lives and the vibrancy of that location. A good example is the Delmar Divide, a socioeconomic and racial dividing line in St. Louis, Missouri. We see this example in Portland as well.*

3. Has Portland FD downsized their apparatus to meet Vision Zero, and if so how has that impacted your apparatus response matrix?
    a. *We have downsized some apparatus over the last decade and are actively seeking vendors to assist us further. To date it has not impacted our response matrix; however, as we continue to reduce apparatus size we believe it will.*

4. What is Portland's residential street width? Is parking allowed?
    a. *Since 2015 the preferred lane width on roadways with lane markings is ten feet. Lane widths on freight routes and transit routes can range from ten feet to twelve feet, with twelve feet and eleven feet, respectively, being typical widths on those streets. On low traffic volume streets, the travel lane width can be as narrow as nine feet.*

5. How did you change the mentality of the Fire Rescue service when you joined the team?
    a. *It was a campaign. This included a comprehensive strategic plan that included over 100 items directly related to firefighters wants and needs. Included in the strategic plan were community risk reduction planning elements. These elements were also highlighted as ways to ultimately reduce workload (call volume) on our firefighters by reducing bad health outcomes in our city. We are constantly marketing this plan and use it to support the Mayor's priorities. It also drives our internal budget. Everything is tied to this plan.*

6. Is it realistic to set a goal to zero for traffic fatality, fire fatality or firefighter casualty? Why do we not use percentages in reduction?
    a. *Yes. The goal must be set to zero. During the strategic planning process we then use percentage of change each year to support the long range goal of zero. We are doing this by providing "micro plans" for each fire management area. Each fire station management area has a plan specific to the uniqueness of that area. In essence we "build a path" to zero.*

7. Does Chief Myers, the Fire Marshal/Fire Code Official, or Traffic Engineering approve traffic calming devices in your locality? How does the Fire department deal with traffic calming devices in urban areas?
    a. *Historically, the City Engineer is authorized to install speed bumps in accordance with Title 17 of the City of Portland Municipal Code which states, Speed bumps shall not be constructed on streets in the City of Portland classified higher than Neighborhood Collector in accordance with the Transportation System Plan (TSP). Only the Offset Speed Bump may be constructed on streets designated as Major Emergency Response streets in the TSP and only after consultation with the designated Fire Bureau representative.*

In 1996 the Portland Bureau of Transportation (PBOT) and Portland Fire and Rescue (PF&R) studied the effects of speed bumps on emergency response time and determined that the heaviest fire trucks can be delayed up to ten-seconds per speed bump. Upon determining this effect, a moratorium on traffic calming collector streets was put in place until a policy could be crafted to address the needs of PF&R.

In 1998 PBOT and PF&R worked out a policy that established Major Emergency Response Routes as part of the City's Transportation System Plan and made such streets off-limits to standard speed bumps of any size. This policy has left many residents that live on residential Neighborhood Collector streets unable to obtain engineered relief from speeding motorists.

PBOT continued researching methods to slow speeding motorists that have less impact on emergency response time. Two types of 'fire friendly' speed bumps have emerged from testing in the US and UK. One design places slots in a standard 14-foot speed bump so that larger vehicles, like fire trucks, can straddle bump sections. These devices are called speed cushions. The shorter 14-foot speed bump is used to offset the tendency for motorist to place one side into a slot to reduce the bump's effects.

In 2010 PBOT and PF&R were again directed to explore how to provide traffic calming to residential collector streets that were designated as Major Emergency Response (MER) routes. Ensuing testing conducted by PDOT and PF&R successfully showed the ability of the offset speed table design to reduce emergency vehicle delay, especially the largest fire trucks that normally suffer the greatest delay. A reduction in maximum delay from 4.8 seconds at standard speed tables where the target response speed is 30 mph to the typical 2 second delay at offset speed tables represents a better than 50% reduction in emergency vehicle delay.

It was eventually collaboratively agreed upon by PBOT and PF&R that a 3-cushion and 4-cushion layout to be an effective compromise to solving the issue of emergency response delays caused by speed tables.

PBOT and PF&R has also recently amended the TSP and adopted a third classification the Emergency Response Classification descriptions. A Secondary Emergency Response Streets classification was created to offer guidance to emergency responders for desired routes during times when Major Emergency Response Streets are congested or blocked, as well as to provide more flexibility to PBOT in the use of traffic calming devices on these routes. The revised classifications provide greater clarity on the use of speed bumps and speed cushions on emergency response streets. Below are the three (3) City of Portland Emergency Response classification intended to provide a network of streets to facilitate emergency response:

Major Emergency Response *streets are intended to serve primarily the longer, most direct legs of emergency response trips.*

1. *Improvements: Design treatments on Major Emergency Response Streets should enhance mobility for emergency response vehicles by employing preferential or priority treatments.*
2. *Traffic Slowing: Major Emergency Response Routes Streets that also have a Local Service or Neighborhood Collector traffic classification are eligible for speed cushions, subject to the approval of Portland Fire and Rescue. Major Emergency Response Streets that also have a District Collector or higher traffic classification are not eligible for traffic slowing devices in the future. Existing traffic speed bumps on Major Emergency Response Streets may remain temporarily and shall be replaced with speed cushions when streets are re-paved or undergo other major modifications, subject to the approval of Portland Fire and Rescue. Speed cushions should be designed to achieve a similar level of traffic speed reduction as speed bumps.*

Secondary Emergency Response *streets are intended to provide alternatives to Major Emergency Response Streets in cases when traffic congestion, construction, or other events occur that may cause undue delays in response times.*

1. *Improvements: Design treatments on Secondary Emergency Response streets should enhance mobility for emergency response vehicles by employing preferential or priority treatments, while also allowing for limited traffic slowing treatments to enhance safety and livability.*
2. *Traffic Slowing: Secondary Emergency Response streets that also have a Local Service or Neighborhood Collector traffic classification are eligible for speed cushions. Secondary Emergency Response Streets that also have a District Collector or higher traffic classification are not eligible for traffic slowing devices in the future. Existing speed bumps on Secondary Emergency Response Streets may remain temporarily, and shall be replaced with speed cushions when streets are re-paved or undergo other major modifications. Speed cushions should be designed to achieve a similar level of traffic speed reduction as speed bumps.*

Minor Emergency Response *streets are intended to serve primarily the shorter legs of emergency response trips.*

1. *Classification. All streets not classified as Major Emergency Response Streets or Secondary Emergency Response Streets are classified as Minor Emergency Response Streets.*
2. *Improvements. Design and operate Minor Emergency Response Streets to allow access to individual properties by emergency response vehicles, but maintain livability on the street.*
3. *Traffic Slowing. Minor Emergency Response Streets are eligible for all types of traffic slowing devices.*

8. Parking protected bikeways can reduce operational space for aerial apparatus and force them to be set up further from building faces. Is this a concern for Portland and if so, how do you handle that?
    a. *PF&R and PBOT have worked closely to find compromises to protected bike lane designs. PF&R looks closely at designs that do not provide options for motorist to move to the right or left on one-way streets to provide clear access of responding emergency apparatus. This could be significantly problematic during peak traffic periods where vehicles are queued up in both directions and emergency apparatus cannot utilize the oncoming or center lane to clear the street segment. Agreed upon alternatives include pliable pylons that can be driven over and low-profile mountable curbing with minimum height of four inches. More restrictive protective bike lane deterrents such as permanent flower pots are approved by PF&R in some situations if appropriately spaced to provide truck placement in various locations along the city block. The removal of parking spaces is often considered in these types of design reviews.*

9. Did Portland FD have to restrict access routes to meet the Vision Zero goals in areas they targeted?
    a. *Not significantly. City of Portland streets identified as Vision Zero high crash corridors are typically in the outlining eastern areas of the city. Streets in these areas were developed with wide rights-of-way in a more/less urban setting. Vision Zero road design concepts such as protected bike lanes, median crosswalk, semi-diverters etc. have been much less restrictive.*

10. To achieve the vision for addressing fatalities like in Portland, do you think it's necessary to have a combined EMS and Fire department? What advice can you give to cities who have these departments separate?
    a. *I do not think it is necessary to have a combined EMS and Fire department, although I have always supported a fire/EMS based approach to care delivery. For us, success will only be achieved by collaborating with all municipal and county agencies that have a role in this type of planning. I do not*

believe it will work if we go at it alone.

11. In your opinion, would a residential fire sprinkler ordinance help with anything?
    a. *Yes. 100% yes. In fact, the fire service will not be able to completely remodel itself unless the construction/development community adopts residential sprinklers.*

Questions for Volpe Center

1. What guidance is available for FDs to develop small rapid response vehicles for routine medical calls, instead of dispatching large trucks for routine calls?
    a. *There have been various pilots and programs for smaller rapid response vehicles in U.S fire departments, and a peer exchange with these fire services might be valuable in the absence of any formal guidance that we are currently aware of. Both Memphis and Portland, OR (see link) have undertaken evaluations showing improved response times and reduced costs associated with RRV programs. There is also information on ultra-high pressure (UHP) pumping technology that can enable faster extinguishment using much less water and therefore potentially a smaller fire vehicle platform (link) if tank capacity can be reduced. For example, this Swedish RRV using UHP and compressed air foam systems (CAFS) is reported to only use 15 gallons per minute, but at 4,000 psi: https://www.firehouse.com/home/news/12166748/firefighting-apparatus-swedish-rapid-response-firefighting-vehicles*

2. Have fire departments considered buying fire trucks from Europe, if American manufacturers aren't capable of producing smaller trucks?
    b. *It appears that decades ago, FDNY and Chicago FD experimented with Magirus (German) and Morita (Japanese) apparatus for higher rescue heights. More recently, there seem to be some alliances between European and U.S. manufacturers, according to an overview presented here: Bronto, a Finnish manufacturer of aerial devices, entered the United States market in the early 2000s, aligning itself with a major manufacturer. It is currently aligned with E-ONE. In 1998, Rosenbauer International acquired the Metz Aerial Group located in Germany. The Kennett Fire Company, Kennett Square, Pennsylvania, purchased a Metz around the same time. In 2004, Metz Aerials USA LLC was established, also in Kennett Square. Today, Metz aerials are available through Rosenbauer.*

3. How are the widths (with outriggers) of the smaller european type fire trucks?
    a. *We have not researched the outrigger widths. However, outriggers can be independently extended to any length required for ladder reach, so it appears that one solution used is to extend the outriggers only on the working side while keeping the non-working side retracted. On the Japanese Morita ladder trucks, this limits width to what appears to be 12 feet based on the above-linked image; also see timeframes 1:11 and then 3:42-4:22 in this Morita manufacturer video. The ladders are lighter weight than U.S. ladders and some (e.g., Magirus) if not all overseas ladder trucks have active hydraulic oscillation damping systems, so they may require less outrigger width. There is an informative comparison in this article.*

4. Do you have any information about how apparatus vendors plan to accommodate the need for ground ladders and larger rescue equipment needed on ladder trucks and aerial apparatus?
    a. *We did not look into this issue specifically, although in our research we noted that London Fire Brigade's workhorse fire vehicles that are dispatched to most fire calls, the Dual-Purpose Ladders (DPLs), carry 30 foot and 44 foot extension ladders on a single-drive-axle chassis. In more detail (per link): The DPL typically carries 44 ft. and/or 30 ft. ladder extensions, eight 59 ft. lengths of hose-reel tubing, four 75 ft lengths of 1.75 inch hose, ten 75 ft lengths of 2.75 inch hose, cutting equipment, a portable generator,*

a lightweight portable pump, water-packs, inflatable airbags, road signs, floodlights, a medical kit, hose ramps, general tools, chemical suits and breathing apparatus.

5. How do you disseminate this information so that all the fire districts understand the advantages to smaller vehicles?
    a. *We welcome your suggestions for the best venues and channels to do this, whether it is through FAMA, IAFC, NACTO publications, US Conference of Mayors, etc. Or perhaps through articles in trade publications and websites.*

6. Did your research identify the compartment storage differences (in cubic meters or feet) between the smaller and larger pumper apparatus?
    a. *There is wide variation in compartment configurations on the models we have seen. It appears that the size and shape of the onboard tank can be flexibly traded off for additional storage volume, see for example this publication, and there can be clever ways of adding storage volume under the seats (e.g., 16 cubic feet on this super-compact pumper). If tank capacity cannot be reduced, at some point shorter pumpers may still require tradeoffs in which equipment is carried on those vehicles, and revisiting operational needs.*

7. Are the smaller fire vehicles less expensive than the standard vehicles?
    a. *We did not research cost, but this would be a logical next step. Since European models appear to be more mass produced (standard rather than custom chassis), they may be less expensive. According to UK fire brigade documents dating to 2010, the price of a 105-foot high aerial ladder platform was up to $240,000 (chassis and body combined). This compares favorably with $840,000 to $930,000 for tiller and platform aerial trucks, respectively, as examples reported by Dover (DE) Fire Department. http://www.doverfire.org/faq.cfm*

8. Is anyone working to make the case with US manufacturers to reign in design envelopes? Particularly with regard to cab-over design, which seems non-existing in the US market. Also does research support the aerodynamic capacity of modern cab-over tractors (thinking the shift to aero-dyne tractors back in the 80s 90s)?
    a. *We are not aware of any specific initiatives with manufacturers to reduce vehicle envelopes, although it is worth noting that at least Seattle and New Orleans both offer examples of significant neighborhood-level overall vehicle length restrictions (30' and 36' respectively, I believe). If combined with education/outreach about available cab-over options, it is possible such programs would encourage fleets to invest in more compact trucks that maintain payload and/or volume but are more maneuverable and comply with the local length limit.*
9. Are smaller trucks actually being purchased by any departments other than Portland? Is this a trend that we can point to yet? Or is it still in the future? Who have been the early adopters?
    a. *At least SFFD is purchasing more compact fire pumpers that are decreasing the front bumper overhang and reducing the axle width. I understand that Nantucket, MA operates particularly compact apparatus as well.*

10. Do you consider the GVWR for fire apparatus in terms of streets' paving and resilience requirements? Have you studied potential changes/differences in station design with new vehicles?
    a. *This is an important point. Deterioration of pavement and bridges is a function of both axle weight and total GVWR. Fire apparatus recently became exempt from federal bridge formula limits on axle and overall weights, per the FAST Act. Axle limits are now up to 33,500 lbs. versus 20,000 for other trucks, and fire apparatus can legally weigh 43 tons versus 40 tons for any other kind of truck. Additionally, tandem-axle tractor-drawn aerials trucks can have an 80-ton GVWR, twice the legal limit for general*

vehicles. Hence there may be an opportunity to reduce negative impacts on bridges and roadways through appropriate downsizing of fire apparatus.

11. What minimum clear zone width should be maintained on an urban street with mid-rise to allow for full deployment of ladder trucks?
    a. *The International Fire Code (which is actually only U.S., and not international), calls for "26-foot width in the vicinity of buildings that are 30 feet or more in height." However, Australian Fire Safety Guideline GL-27 requires **19 feet clear width** in these circumstances, in fact for buildings greater than two stories and up to 65 feet height: "road access to developments within this category should always be provided via an access road of 3.5 metres minimum width with an additional 2.9 metres available for the use of stabilising legs on a ladder platform type emergency vehicle." Also, according to emergency access guidelines we found from the fire and rescue service in West Yorkshire, UK, fire access routes are required to have **12 foot clear width** for high reach aerial trucks (**19.5 feet** in pedestrianized areas with tall buildings).*

Questions for All

1. Given 70+% of calls are medical, what is the thinking of using a motorcycle packed with medical supplies? By far fastest way to get anywhere under just about any traffic or constrained condition.
    a. *Chief Myers: This has been a successful delivery model for years in Europe and Asia. I would not be opposed to this type of model in the US. Most medical directors require a two person response. This would have to change.*
    b. *Volpe: Daytona Beach has had a fire paramedic motorcycle unit since the 1990s, and Miami and Austin, TX are among major U.S. cities that appear to have recently had fire paramedic motorcycle units.*

2. Do smaller trucks impact ISO ratings, which increases homeowner insurance costs?
    a. *This is a great question. Smaller trucks could impact ISO ratings. It depends on the amount of water (tank) an apparatus can carry, pump capacity and the equipment on the truck. Apparatus size today has also been driven by regulation. Requirements to carry certain equipment and engine emission control devices have all lent to the increase in size.*

3. So how does a city get to a point that they can routinely build tighter turns? Besides updating city fleet vehicles, do you need ordinances to restrict use of private trucks that require large turning radius?
    a. *The City of Portland classifies street function for six modes of transportation, Pedestrians, Bicycles, Transit, Freight, Emergency Response and a general Traffic classification. Many of the streets designated for Major Emergency Response will naturally coincide with higher classifications for Freight vehicles, and the standard design vehicle for freight access is a tractor with a 67-foot trailer (WB-67). Most emergency response vehicles are smaller than this (B-40), so will not have issues in such situations. Where a fire truck would be the common largest expected vehicle on a street designated for their use, the corners will often be designed for such vehicles. Otherwise, streets are designed to accommodate access with the expectation that larger emergency response vehicles can and will use all available space to begin and/or complete a turn, including the use of opposing lanes.*

    One strategy that has been employed to provide a larger radius for turning trucks, and deter the associated higher speeds by more typical traffic, is the corner truck island. This design uses a large radius corner for trucks and places a mountable low island in the middle of the corner, between crosswalks, to encourage smaller vehicles to follow a smaller radius, at a lower speed. Corner truck aprons are a variation on the concept.

4. Would love to hear thoughts on clear width. Most fire departments require 16-20 feet of clear width on streets to be able to set up equipment. This is usually applied corridor wide, but does it have to? Separated bike lane projects on one-way streets can often seek to reduce intersection widths to levels that come in conflict with desired clear widths. Please comment on clear width requirements corridor wide and if small sections can be designed below this width.
    a. *PF&R typically uses the same 16 to 20-foot standard for aerial ladder deployment. However, if this standard was uniformly applied to all city streets with no compromise, protective bicycle and pedestrian road design projects would never get off the ground. For that reason, PBOT and PF&R work collaboratively to find creative ways to appease both competing interests. This can be labor intensive from a review process because each segment of street is scrutinized individually. It should be noted the removal of parking in these redesigns is a tool that is strongly considered in the City of Portland.*

5. Why does IFC require 26 ft wide aerial access routes? Does this width need to be consistently maintained or only in staging areas? Are there alternatives?
    a. *PBOT and PF&R are working together and have relaxed this standard when appropriate.*

6. I have heard from someone that firefighter unions may have an interest in keeping the number of firefighters assigned to each vehicle high to increase employment, which in turn could keep fire trucks large. That in turn governs street design. Is that true or happening? Are fire departments mandated to have a certain number of staff available to respond? Does that influence the sizes and types of vehicles?
    a. *I have not heard this and I think it is likely a myth. Labor is always concerned with having the appropriate level of staff on a call to deploy safely. In many cities the required staff is stated in the contract. This does not; however, drive truck size. I would say, it is very important to include labor team members when discussing major change such as this.*

7. Can you talk about your experience with some of the new and emerging vehicle safety devices such as Vehicle to vehicle devices, LIDAR, pedestrian warning systems, automatic braking, etc on emergency vehicles?
    a. *PF&R is currently providing source date for HAAS Alerting systems in the beta testing phase. Six of our apparatus have been outfitted with hard-wired light bar transmitters which alerts subscriber vehicles if those apparatus are approaching an intersection code-three.*

8. What comes first, narrow street and road design or updates to the fleets?
    a. *Somewhat of a subjective question. The narrow streets are already in existence with limited right-of-way. The removal of existing houses is not a viable option especially when the City of Portland is experiencing a moderate affordable housing crisis. The city does claim private property frontal easements in some situations to ease the widening of a streets but offers limited solutions. I personally do not see*

modifications to fleet fire apparatus soon. Compromise between transportation planners and fire departments seem to be the only near-term viable option. Response times of emergency responder cannot be sacrificed however some flexibility by traditional fire departments must occur which starts with collaborative communication with their city planners.

9. How do you reconcile narrower streets for safety/complete streets/vision zero reasons with the fact that fire truck fleets are not renewed/rebought that regularly?
    a. *PF&R has nearly completed the replacement cycle of its entire fleet of apparatus with full-size engines and trucks which will be in service for the next 20 to 30 years. It is the philosophy of PF&R leadership that the streets in the City of Portland will no longer be designed around the size of our apparatus. The traditional fire service mindset regarding access and deployment can be flexible if properly managed. Fire departments experiencing similar challenges such as Portland should budget for a full-time resource to liaison with their local transportation bureau. This individual should have the technical ability to evaluate and amend existing transportation system plans and develop a street modification review process which accommodates both interests.*