

Vancouver Fraser Port Authority

South Shore Emergency Access Study

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Executive Summary

The Centerm Container Terminal (Centerm) on the south shore of Vancouver's inner harbour is one of three primary container terminals in the Vancouver area and handles approximately one-fifth of the container goods shipped through Vancouver. DP World Vancouver (DPWV) operates the terminal on federal lands and waters which is leased from the port authority.

Trade of containerized goods shipped through Canada's west coast is increasing. In 2015, container terminals on the west coast of Canada (including Vancouver and Prince Rupert) handled more than 3.8 million Twenty-foot Equivalent Units (TEUs), with nearly 3.1 million TEUs handled by container terminals in the Port of Vancouver. The Port of Vancouver's container terminals (Vanterm, Deltaport, Fraser Surrey Docks, and Centerm) are currently able to handle an estimated 3.9 million TEUs per year.

Independent forecasts completed for the Vancouver Fraser Port Authority (port authority) by international experts in transportation and trade indicate that container traffic through the west coast of Canada will increase by approximately 3.5 million TEUs by 2035. This growth is driven primarily by the growing demand between Canada and Asian markets for imported products such as clothing, food, electronics and manufacturing inputs, such as car parts, and exports of Canadian products such as pulp, paper, lumber and specialty grains.

The proposed Centerm Expansion Project (CEP) is a series of improvements to the Centerm Container Terminal. The proposed infrastructure improvements will increase the number of containers that can be handled at Centerm by approximately two-thirds, from a current maximum annual capacity of 900,000 Twenty-foot Equivalent Units (TEUs) to 1.5 million TEUs. During peak operations, the number of containers that can be handled at the terminal will increase from an annual sustainable capacity of 750,000 TEUs to 1.3 million TEUs. To increase the container capacity of the terminal by 67 per cent, the proposed terminal improvements include an expansion of the terminal footprint by 15 per cent and reconfiguration of the terminal.

The terminal entrance, at the eastern end of Centerm, is to be reconfigured as part of the proposed CEP. This will result in the removal of the existing Heatley Ave Overpass. The removal of overpass, poses a potential impact to the response time for emergency services attending the port lands. This is due to rerouting via other south shore access points, and passage through port lands over multiple railway crossings. This can be mitigated through the introduction of an overpass in the vicinity of the Centerm terminal entrance which would replicate the connectivity of the Heatley Ave Overpass once it is removed. This proposed overpass would connect Centennial Rd eastward to Clark Drive, spanning the busy railway crossings of AGT and Vanterm.

There is minimal difference between the anticipated response times for emergency vehicles attending the south shore port area whether they are accessing via the existing Heatley Overpass, or via Clark Dr and a proposed Centennial Rd Overpass. The current average response time is estimated as 658 seconds, while the response time for the proposed Project is 614 seconds (approximately 6.6% improvement), but still above the City of Vancouver target response time of 10 minutes (600 seconds).

As a result, the proposed Centennial Road overpass would be an appropriate replacement for the Heatley Ave Overpass following its removal. The proposed replacement overpass provides a relatively minor difference in access to the adjacent area compared to the existing Heatley Ave Overpass, thus, is equally rated when considering overall access connectivity.

With regard to a proposed roadway linking Waterfront Road and Centennial Road, there is almost no difference for emergency vehicles access response times to the south shore without this linkage in place when compared to Centennial Road Overpass with a Waterfront Road extension included. However, the reduced connectivity may pose an increased risk of a congested evacuation route in emergency situations.

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Appendix A. Emergency Service Access Map

1. Introduction

The Centerm Container Terminal (Centerm) on the south shore of Vancouver's inner harbour is one of three primary container terminals in the Vancouver area and handles approximately one-fifth of the container goods shipped through Vancouver. DP World Vancouver (DPWV) operates the terminal on federal lands and waters which is leased from the port authority.

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AECOM, with de Leur Consulting, has been retained by the port authority to investigate emergency access arrangements to the port authority's south shore in the vicinity of Centerm.

The terminal entrance, at the eastern end of Centerm, is to be reconfigured as part of the proposed CEP. This will result in the removal of the existing Heatley Ave Overpass. In its place, the terminal intermodal yard will be extended and new truck entry gates will be introduced. The final road layout in the vicinity of the terminal entrance will comprise one or more of the following possible connections:

- At-grade crossing linking the Waterfront Road extension to Centennial Road;
- Overpass linking the terminal entrance with Clark Drive.

2. Purpose

This report reviews emergency access to the south shore port lands with regard to the potential changes associated with the CEP. The study will:

- Determine, using historical data, the likelihood of:
 - a) An incident occurring in the South Shore area west of Clark Drive.
 - b) Clark Drive access being denied in the event of an incident.
- Identify the impact on emergency response of having Centennial Road Overpass (CROP) in place of Heatley Avenue Overpass
- Identify the impacts to protocols used for emergency response services/coordination by Port Authority Operations.

3. Existing Network

This section captures the existing roads, access points, and railway crossings that are located within the south shore port lands west of Clark Drive.

3.1 Existing Roads

The existing road network comprises the following roads:

- Waterfront Road;
- Main Street;
- Heatley Avenue;
- Centennial Road/Stewart Street/Commissioner Street;
- Rogers Street, and
- Clark Drive.

Refer to Figure 1 for a map of the existing road network in the vicinity of Centerm.

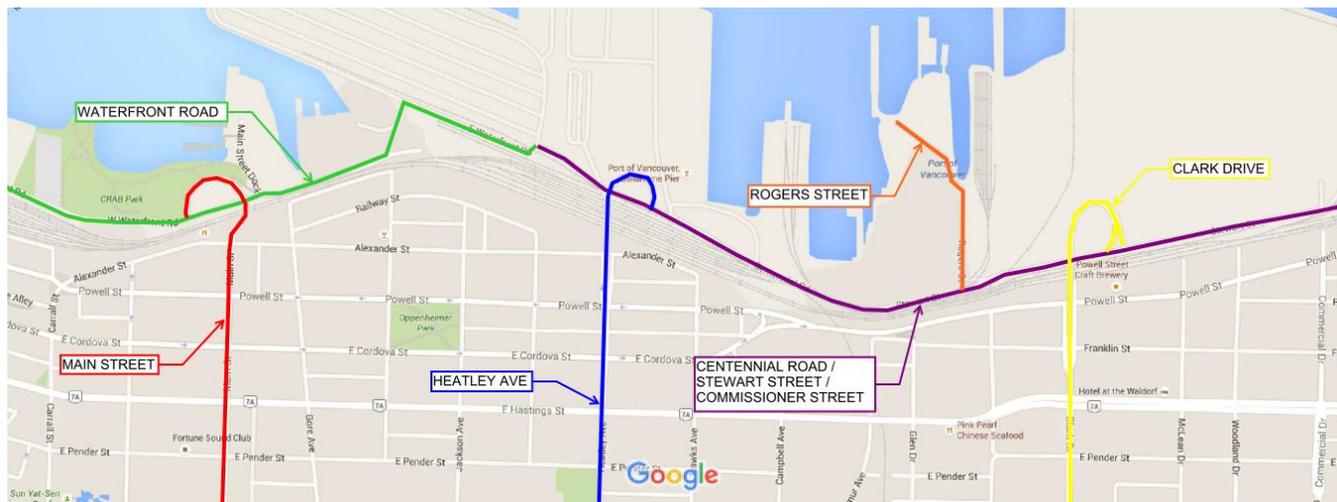


Figure 1: Existing Roads

3.1.1 Waterfront Road

Waterfront Road is an existing two lane collector road with parking controls in place on both sides of the road. It runs east to west along the south shore of Burrard Inlet from Thurlow St to Dunlevy Ave where it meets the Centerm Dunlevy Ave entrance.

It is a designated truck route and is a direct access to the Vancouver Convention Center loading docks below Canada Place street level.

3.1.2 Main Street

Main Street is an existing multilane arterial street that runs in the north to south direction. It is a designated truck route as well as a bus route for the No. 3 bus. Main Street has regulated parking restrictions on both sides of the road and has shared road used bicycle markings along commercial districts on Main Street. At the north end, it crosses the CP rail Right-of-way using an overpass to connect into Waterfront Road.

Main Street provides a direct street connection between Marine Drive (near Fraser River) and Waterfront Road (Vancouver Harbour).

3.1.3 Heatley Avenue

Heatley Ave is a two lane road with permitted parking on each side of the street. Heatley runs in the north to south direction from Atlantic Ave to Centennial Road. Heatley Ave turns into an overpass north of Powell Street where it enters the south shore corridor.

Heatley Ave Overpass is part of the port's security cordon and acts as the visitor entry point to the port lands. Visitors are required to go through a security gate before they can enter the south shore.

3.1.4 Centennial Road /Stewart Street/ Commissioner Street

Centennial Road/ Stewart Street/ Commissioner Street is a two lane road with prohibited parking stretching from the Centerm container terminal in the west to McGill St, adjacent to New Brighton Park in the east.. Centennial Road (between Heatley and Rogers) runs in the east to west direction, changing into Stewart Street (between Rogers and Victoria), and finally becoming Commissioner Street (between Victoria and McGill). There are security gates at the west end of the corridor adjacent to the Commissioner St. truck staging area. Centennial Road/Stewart St/Commissioner St is the primary route for truck traffic within the Port Lands.

3.1.5 Rogers Street

Rogers Street is a side street that provides access to the Lantic (Rogers Sugar) property. It is a two lane road with restricted parking on both sides of the road. It runs in the north to south direction and intersects with Stewart Street. Rogers Street is not a through road, terminating at the north end within the Lantic property (close to the shore line).

3.1.6 Clark Drive

Clark Drive is a multilane arterial road within the City of Vancouver that is also a designated truck and bus route. Clark Drive runs north-south and is a direct route connecting Vancouver to Richmond (from Vancouver Harbour to Westminster Highway in Richmond). Clark Drive is known as Knight Street (south of 12th Ave) and is classified as in the Major Road Network (MRN). There are various parking regulations along the entire length of Clark Drive/Knight Street. At the northern end of Clark Drive, it connects to the Port Lands, accesses via an overpass (north of Hastings St.). Entry is controlled via a security gate at the end of the overpass before that is restricted to pass holders only.

3.2 Port Access Points

The South Shore Port Lands are restricted for public access. All entrants must pass through security gates before they can proceed to their destinations within the Port Lands. The south shore can only be accessed at the following locations:

- Waterfront Road / Dunlevy Ave (for access into Centerm Maintenance only);
- Heatley Ave Overpass;
- Clark Dr Overpass, and
- Commissioner Street.

See Figure 2 for South Shore Corridor Access Points.

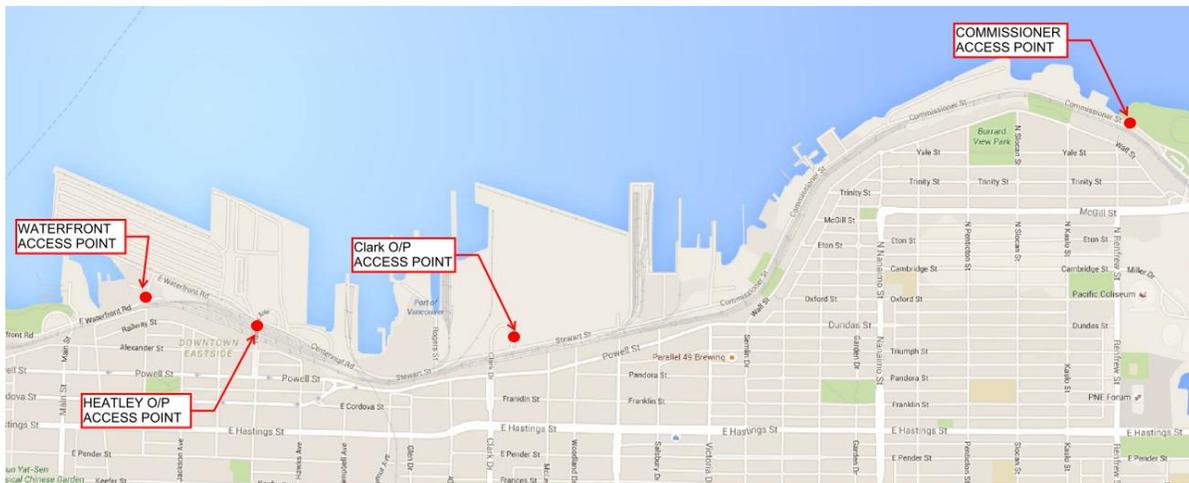


Figure 2: South Shore Corridor Access Points

4. Proposed Changes

As part of works associated with the CEP, the Heatley Ave Overpass will be removed to facilitate the expansion of the terminal's intermodal yard and reconfiguration of the terminal entrance area. Adjacent to the terminal entrance, the project intends to introduce road network changes to compensate for the removal of Heatley Avenue Overpass.

4.1 Waterfront Road

A new roadway connection south of Centerm linking Waterfront Road west of Dunlevy, to Centennial Road east of the terminal. Where this link meets the extended Centerm Intermodal yard tracks, the crossing would be at-grade, crossing up to two intermodal yard tracks.

4.2 Centennial Road

The existing Centennial Road corridor will be maintained, connecting the Centerm terminal entrance to Clark Drive and beyond. Future alterations would include the introduction of grade separation on Centennial Road crossing the three road-rail grade crossings between Centerm and Clark Drive.

5. Emergency Considerations

When an emergency situation occurs within the south shore port lands, emergency vehicles enter via one of the access points noted in Section 3.2. Emergency services facilities located near to the south shore:

- Firehall No. 2 at Main Street and Powell St
- Firehall No. 1 at Heatley Ave south of Prior St
- Firehall No. 14 at Venables St at Kaslo St
- BC Ambulance on Cordova St, near Heatley Ave
- Vancouver Police at the corner of Main St and Cordova St

Figure 3 below shows all the emergency services located near the area. The emergency incident analysis are under the assumption that the emergency vehicles which responded to the incidents in each zones are from their own stations/precinct (i.e.: vehicle unit VAB2 is from Fire Hall #2). But practically, the emergency units could be loaned to another station/precinct or the emergency unit was patrolling nearby when an incident happened so they happen to be the first unit on scene regardless of which station/precinct it originated from.



Figure 3: Existing Emergency Services

5.1 Emergency Event History

Emergency event data for 2013 and 2014 was sourced from the Vancouver Fire Department (VFD) to determine the types of events that have historically occurred on the south shore, where they occur and to allow a prediction of the likely access point to the port lands. VFD data was selected it provide first responder service information.

For the purposes of assessing event occurrences, the port lands between Centerm and Vanterm/Clark Drive was divided into six zones as indicated in Figure 4.

- Zone 1 - Centerm West;
- Zone 2 - Centerm East (terminal entrance);
- Zone 3 - Lantic & SRY;
- Zone 4 – Alliance Grain Terminal (AGT);
- Zone 5 – Vanterm;
- Zone 6 - New Brighton Road & Commissioner St (the remainder of the south shore)

Table 1 summarises the incident data used for the assessment, and a map highlighting the data for each segment is contained in Appendix A.

Table 1: Emergency Response Data

	2013 Emergency Incidents						2014 Emergency Incidents					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Medical	0%	16%	11%	5%	32%	37%	0%	0%	0%	0%	50%	50%
Hazmat	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fire	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
Other	0%	4%	38%	0%	0%	58%	0%	26%	22%	0%	0%	57%

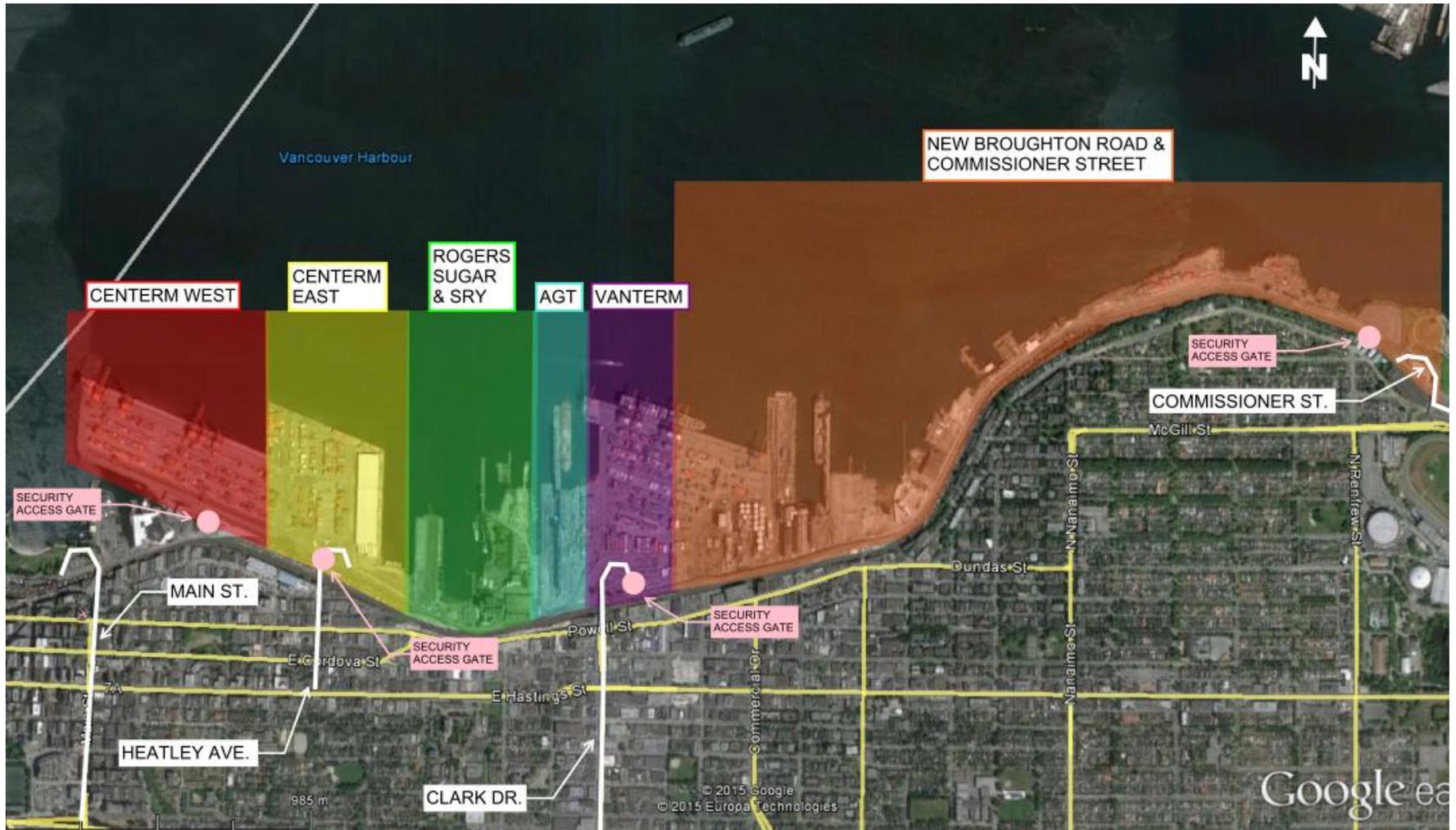


Figure 4: Emergency Access Segments

6. Emergency Access Impacts

Due to the lack of information associated with the emergency response incident data, it is not possible to clearly define the origins and destinations of emergency response vehicles when called to the port authority south shore lands. Therefore, a series of potential and most practical routing options were created to evaluate the impact of the emergency access locations, given the potential changes that may occur as a result of the removal of the Heatley Avenue overpass.

6.1 Origins of Emergency Responders

Although it is understood that the origin of responding emergency vehicles could be from anywhere (i.e., an emergency response vehicle may be rolling/patrolling or may be from a distant precinct), it was necessary to establish likely origins for emergency responders to evaluate the access impacts. As such, the locations of nearby Fire Halls and Ambulance Stations were considered since these locations represented logical origins for emergency responders. The fire hall and ambulance locations that were considered included:

1. Vancouver Fire Hall Number 2, located at 199 Main Street, near Powell Street
2. Vancouver Fire and Rescue Services, located at 900 Heatley Avenue near Prior Street
3. Vancouver Fire Hall, located at 1805 Victoria Drive near East 2nd Avenue
4. BC Ambulance Service, located at 731 East Cordova Avenue near Heatley Avenue

These potential origins reflect starting points that are located to the southwest, south, and southeast of the port authority South Shore lands in the vicinity of the Heatley Avenue overpass access. Therefore, the following assumptions are made for emergency response access to the South Shore:

1. If an emergency response vehicle is located west of Main Street, then access to the South Shore will be via Main Street and through the Waterfront Road access point.
2. If an emergency response vehicle is located east of Clark Drive, then access to the South Shore will be via Clark Drive through the Clark Drive Overpass access point.
3. If an emergency response vehicle is located east of Main Street, west of Clark Drive and north of Prior Street, then access to the South Shore could be through one of three access points including:
 - a) Waterfront Road access point via Main Street
 - b) Clark Drive Overpass access point via Clark Drive
 - c) Heatley Drive Overpass access point via Heatley Drive (if available)
4. If an emergency response vehicle is located south of Prior Street between Main Street and Clark Drive, then access to the South Shore would be through Waterfront Road access point via Main Street or Clark Drive Overpass access point via Clark Drive.

Following from the assumptions listed above, three potential origins are selected for the analysis of the impacts on the emergency response. The origins are as follows:

1. Origin 1: Main Street at Powell Street
2. Origin 2: Clark Drive at Hastings Street
3. Origin 3: Heatley Drive at Powell Street

6.2 Destinations of Emergence Responders

Figure 4 identified several zones that would reflect the potential destinations for emergency responders and are listed again below. It is noted that the New Brighton Road and Commissioner Street zone is not included since the area is located east of Clark Drive and as such, this zone will not likely be adversely impacted by the Heatley Drive Overpass access point (i.e., emergency vehicle access to this zone will likely be through the Clark Drive Overpass access point via Clark Drive or from McGill). Some data was available to help understand the likelihood of an emergency response at each of these locations/zones, which is used in the assessment of the impact of the access. This emergency response data was provided in Table 1.

1. Destination Zone 1: Centerm West;
2. Destination Zone 2: Centerm East;
3. Destination Zone 3: Lantic and Southern Rail Yards (SRY);
4. Destination Zone 4: Alliance Grain Terminal (AGT);
5. Destination Zone 5: Vanterm;
6. Destination Zone 6: New Brighton Road & Commissioner St (the remainder of the south shore)

Zone 6 is not considered in this assessment.

6.3 Methodology to Evaluate Impact on Emergency Response

There were four variables that were formulated to assess the impacts of the emergency response for incidents occurring within the five zones along the South Shore corridor. These variables reflect the resistance created by the route for an emergency responder to attend an incident. A measure of the level of resistance would allow for the relative assessment of route options and access availability. For example, a route with less resistance would allow emergency responders to attend an incident quicker and would be preferred over a route with greater level of resistance. The variables used to assess the level of resistance include:

- | | |
|-----------------------|---|
| 1. Distance: | Approximate distance (in kilometers) from origin to destination |
| 2. Time: | Approximate travel time (in minutes) from origin to destination |
| 3. Intersections: | Number of intersections encountered by emergency responders |
| 4. Railway crossings: | Number of railway crossing encountered by emergency responders |

Google Maps was used to evaluate the distance and time variables since the directions tool within Google Maps provides an estimate of the distance and time between an origin and a destination. Although the information from Google Maps is approximate, it was felt that it would be suitable for a relative comparison. An example from Google Maps for a route between Fire Hall No. 2 (located at Main Street and Powell Street) and Rogers Sugar (Zone 3) is shown in Figure 13, indicating a travel time of 5 minutes and a distance of 2.1 kilometers (assuming there were no railway crossing delays).

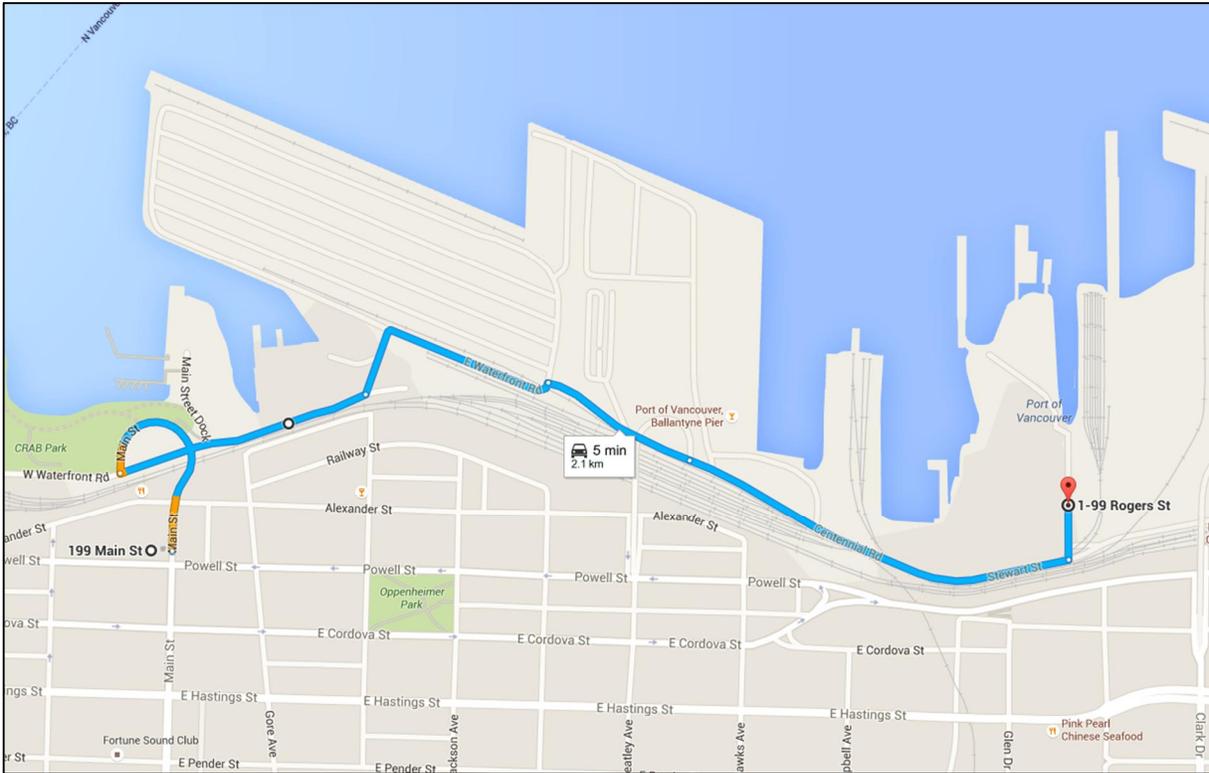


Figure 5: Google Maps to Evaluate Distance and Time.

Since the level of precision associated with the time estimate in Google Maps was limited (i.e., time is provided to the nearest minute), it was necessary to calculate an average speed based on all trips (i.e., distance over time) and then this average speed would be applied to the travel distance to get a better approximation of response time. In addition, a multiplier of 2x was applied to reflect the fact that emergency vehicles that are responding to call are likely to be traveling faster than the estimates provided by Google, which are based on non-emergency travel speed.

The evaluation of the number of intersections and the number of railway crossings was completed by simply examining the potential routes and counting the number of intersections and railway crossings that would be encountered by emergency responders. Routes with fewer intersections and railway crossings would have less resistance and thus, be favoured over those routes with more intersections and railway crossings.

Not all intersections and railway crossings would offer the same level of resistance. Intersections with greater traffic volume and more traffic controls (e.g., signals) would offer a greater level of resistance when compared to a minor intersection with minimal traffic controls. Similarly, a railway crossing with several long trains per day has more resistance than a railway crossing that may only be used once per week. Therefore some priority assignments were made to intersections and railway crossings to better reflect the level of resistance. A subjective assessment was used to prioritize the intersections and railways crossings, which resulted in three levels of priority including high resistance, moderate resistance and low resistance. Table 2 lists the emergency vehicle response time delays for intersections and railway crossings, which were then applied to each route.

Table 2: Response Time Delays for Intersections and Railway Crossings

Facility	Response Time Delay (seconds)		
	High Resistance	Moderate Resistance	Low Resistance
Intersections	20 seconds of delay per intersection	10 seconds of delay per intersection	5 seconds of delay per intersection
Railway Crossings	1286 seconds per crossing (Blocked 5 hours per week)	429 seconds per crossing (Blocked 1.5 hours per week)	86 seconds per crossing (Blocked 0.3 hours per week)

Using the resistance measures, which are given in units of time (seconds), the emergency vehicle response time for each origin – destination (O-D) route was determined. This allows for a relative comparison between routes and facilitates the quantification of the impact on emergency response due to the removal of the Heatley Ave overpass access point.

The final component of the evaluation methodology was to utilize information on the demand for emergency responders by destination. As shown in Table 1, there were approximately 80 emergency response incidents over a two-year period between 2013 and 2014, with the breakdown by location / zone provided in Table 1. Although the sample size of the incident data is relatively small to make definitive conclusions, the data was used to reflect the demand for emergency responders and to evaluate the impacts of different routes and access locations. The demand for emergency response for each destination zone was categorized into high, moderate and low, with Zone 3 being ranked as 'high' demand (40% of demand in Zones 1 to 5), Zones 2 and 5 being ranked as 'moderate' demand (20% of demand in Zones 1 to 5) and Zones 1 and 4 being ranked as 'low' demand (10% of demand in Zones 1 to 5).

6.4 Resulting Impacts on Emergency Response

Table 3 provides a measure of the resistance, given as the estimated time from origin to destination for each potential route (15 routes, with three origins and the five destinations). As can be seen from the results in Table 3, the Heatley Avenue overpass access location is an effective access for any emergency response vehicle that is located east of Main Street, west of Clark Drive and north of Prior Street when called to an incident at the South Shore. The column marked 'Total Based on Demand' reflects the sum of the demand proportions for each Zone (10% x Zone 1 + 20% x Zone 2 + 40% x Zone 3 + 10% x Zone 4 + 20% x Zone 5) and the column marked 'Average' is the simple aggregated response time, which is calculated as the average for all three origins ((631+540+777)/3 = 658).

Table 3: Response Time From Origins to Destinations

Origin	Time (Seconds) From Origin to Destination						
	Zone 1 Centerm West	Zone 2 Centerm East	Zone 3 Lantic & SRY	Zone 4 AGT	Zone 5 Vanterm	Total Based on Demand	Average
Main at Powell (via Main to Zone 1 and via Heatley to Zones 2 to 5)	105	172	743	755	1195	631	658
Heatley at Powell (via Heatley Access)	71	62	612	624	1064	540	
Clark at Hastings (via Clark Access)	1116	1104	950	510	70	777	

If the Heatley Avenue overpass access is closed to accommodate the expansion of the Centerm terminal, then emergency response vehicles that are located east of Main Street, west of Clark Drive and north of Prior Street will have to use the Waterfront Access (via Main Street) or the Clark Drive access (via Clark Drive) when called to an incident at the South Shore. This will increase the time to the destination, as shown in Table 4. The row marked 'Increased Level of Delay' is the difference between the travel time to each Zone without the Heatley Ave Overpass and the travel time with the Heatley Ave Overpass (e.g., for Zone 1 in Table 4 below: 131 = 202 - 71).

Table 4: Increased Response Time if Heatley Avenue Overpass is Closed

Origin	Time (Seconds) From Origin to Destination					
	Zone 1 Centerm West (via Main)	Zone 2 Centerm East (via Clark)	Zone 3 Rogers & SRY (via Clark)	Zone 4 AGT (via Clark)	Zone 5 Vanterm (via Clark)	Total Based on Demand
Heatley at Powell	202	1285	1125	684	244	844
Increased Level of Delay	+131	+1223	+513	+60	-820	+304

6.5 Emergency Response Impacts of a proposed Centennial Road Overpass (CROP)

To address the impacts caused by the closure of the Heatley Overpass access (i.e., the increased travel time for emergency vehicles to service the South Shore lands), a Centennial Road Overpass (CROP) has been proposed. The details of this option would include the following:

1. Centennial Road Overpass (CROP) is constructed;
2. Heatley Avenue Overpass is removed;
3. Centerm Facility is expanded, increasing rail traffic over the Centerm at-grade crossing; and,
4. No modifications or extensions to Waterfront Road will be provided.

The response times for the set of origins and destinations associated with this improvement is provided in Table 5. Due to the grade separated Centennial Road Overpass and the corresponding reduction in the delays caused by blocked railways, there is a reduction in the average response time for emergency vehicles to service the South Shore corridor. Given this proposed overpass, it is assumed that all emergency response calls that are required in Zone 1 (Centerm West) would have to use the access from Main Street (i.e., access from the east on Centennial Road could not reach Zone 1). In addition, it is assumed that emergency response calls to all other zones (Centerm West, Rogers, AGT or Vanterm) would have to use the Clark Street access.

Table 5: Response Times for a Centennial Road Overpass Option

Origin	Time (Seconds) From Origin to Destination						Average
	Zone 1 Centerm West (via Main)	Zone 2 Centerm East (Via Clark)	Zone 3 Lantic & SRY (via Clark)	Zone 4 AGT (via Clark)	Zone 5 Vanterm (Via Clark)	Total Based on Demand	
Main at Powell	105	389	1205	764	324	712	614
Heatley at Powell	202	286	1101	661	221	628	
Clark at Hastings	269	142	951	510	70	501	

An additional scenario was also considered that included both a Centennial Road Overpass and a new, at-grade connection to link East Waterfront Road with Centennial Road (referred to as the Waterfront Road Extension). This concept would allow emergency vehicles to access all 5 zones of the South Shore via Main Street rather than only Zone 1. However, the Waterfront Road Extension would be at-grade and emergency vehicles would have to cross the Centerm rail crossing and activities associated with the expanded Centerm terminal. Because of the busy railway crossing at Centerm and the potential for delays, it was determined that the Waterfront Road Extension does not help to reduce the response time for emergency vehicles to service the South Shore.

6.6 Emergency Transport to Hospitals (Egress Movement)

The analysis has focused on the response time for emergency vehicles to get to an emergency on the South Shore. However, there is also a need to examine the time required for ambulances to transport injured persons from the incident location to the hospital. As such, the response times for an ambulance to get from the incident locations (i.e., the 5 destination zones) to nearby hospitals are provided in Table 6. Included in Table 6 are the following three scenarios:

1. Existing conditions (i.e., the Heatley Overpass is available)
2. Removal of the Heatley Overpass
3. Centennial Road Overpass (CROP) is available

It is noted that there are three hospital locations that would likely be used to transport a person who is injured at the South Shore, including Vancouver General Hospital (VGH), St. Paul’s Hospital and the future proposed location of St. Paul’s Hospital.

For the results presented in Table 6, the travel time from the incident location to the intersection of Hastings Street at Main Street was determined, and this travel time was then added to the travel time that represents the average travel time from the intersection of Hastings Street at Main Street to the three hospitals noted above.

Table 6: Travel Time To Transport Injured Person from South Shore Incident to Hospital

Scenario	Time (Seconds) From Zone to Nearby Hospitals					Total Based on Demand
	Zone 1 Centerm West	Zone 2 Centerm East	Zone 3 Rogers & SRY	Zone 4 AGT	Zone 5 Vanterm	
1) Existing Conditions	424 (via Main)	460 (via Heatley)	1022 (via Clark)	1011 (via Clark)	561 (via Clark)	756
2) Without Heatley O/P	424 (via Main)	1617 (via Clark)	1022 (via Clark)	1011 (via Clark)	561 (via Clark)	988
3) With the CROP	424 (via Main)	654 (via Clark)	1022 (via Clark)	1011 (via Clark)	561 (via Clark)	795

6.7 Summary of the Impacts on Emergency Response

The Heatley Avenue overpass is currently an effective access to the port authority’s south shore for emergency response vehicles, particularly for locations in close proximity to the Heatley Avenue access location, with an average response time of 658 seconds (Table 3). If the Heatley Avenue access were eliminated there is expected to be a significant increase in the response time for emergency vehicles that originate in the area east of Main Street, west of Clark Drive and north of Prior Street, with the estimated average response time for these emergency calls increasing by an average of 304 seconds (Table 4).

However, the increase in the response times for emergency vehicles can be mitigated with the proposed grade-separated Centennial Road Overpass (CROP). As can be seen from the results in Table 5, the CROP option will reduce the response time for emergency vehicle service to the port authority’s south shore. The estimated average emergency vehicle response time is 614 seconds for all O-D combinations, which is lower than the estimated

average emergency vehicle response time of 658 seconds for all O-D combinations associated with the existing conditions (Table 3). However, it is noted that response times for some O-D combinations is faster for the existing conditions with the Heatley Avenue overpass in place. The reduced response time is due to the ability of emergency response vehicles to avoid rail crossings due to the routing (via Main Street to Zone 1 and via Clark Drive to Zones 2 to 5) and the grade separation provided by the Centennial Road Overpass.

The travel time for an ambulance to transport an injured person from an incident location on the south shore to nearby hospitals was also evaluated (Table 6). The results indicated that the existing conditions with the Heatley Ave Overpass in place offered the quickest travel time (756 seconds) and that the removal of the Heatley Ave Overpass caused a significant increase on travel time to nearby hospitals ($988-756 = 232$ seconds). However, the CROP can largely mitigate the increased travel time with the travel time only increasing by 39 seconds ($795-756 = 39$ seconds) relative to the existing conditions.

There is expected to be an overall improvement in the response times for emergency vehicles to service the port authority's south shore with the proposed grade-separated Centennial Road overpass and the removal of the Heatley Avenue Overpass. However, it must be understood that some emergency vehicle response times for some O-D combinations will increase with the removal of the Heatley Avenue Overpass access. There is also expected to be a slight deterioration in the travel time for ambulances to take injured persons to Vancouver area hospitals with the closure of the Heatley Avenue overpass, largely due to the locations of the hospitals relative to the south shore.

7. Access

With the proposed changes to the road network, anticipated access to locations within the study area are outlined in Table 7 below. This table highlights that the overall accessibility to the south shore port lands west of Clark Drive does not significantly change in the future case if an overpass is introduced to replace the removed Heatley Ave Overpass. The proposed CROP provides a level of connectivity comparable to that presently provided by the Heatley Ave Overpass.

Table 7: Port Lands Access arrangements

Zone	Heatley Ave Overpass	Proposed Centennial Road Overpass
Zone 1 Centerm West	Access via Dunlevy Gate using Main St –existing conditions.	Access via Dunlevy Gate using Main St – no change to existing conditions.
Zone 2 Centerm East	Access to terminal entrance gates via Heatley Ave Overpass.	Access to terminal entrance gates via Clark Dr – grade separated route retained.
Zone 3 Lantic & SRY	Access to site limited by rail crossings – no change to existing. Heatley Ave Overpass provides connection to west side of SRY property without interaction with rail crossings..	Access to site limited by rail crossings – overpass does not change conditions – matches existing. Overpass provides connection to west side of SRY property.
Zone 4 AGT	Access to site limited by rail crossings – no change to existing conditions.	Access to site limited by rail crossings – overpass does not change conditions – matches existing conditions.
Zone 5 Vanterm	Access to site limited by rail crossings – no change to existing conditions.	Access to site limited by rail crossings – overpass does not change conditions – matches existing conditions.
Zone 6 Remainder of the south shore	No changes anticipated. All access via Clark Drive.	No changes anticipated. All access via Clark Drive.

8. Emergency Evacuation

While the arrival of emergency vehicles attending emergency events within the south shore corridor has been the primary focus of this memo, consideration has to be given to the impact on emergency evacuation routes. The removal of the Heatley Ave Overpass will change the routing of vehicles exiting port lands under emergency conditions. Presently, the majority of persons working on the south shore are afforded two egress points from the south shore. The anticipated evacuation routes, compared to existing routes, are set out in Table 8.

Table 8: Evacuation Routes

Zone	Present Egress Routes	Centennial Road Overpass + Waterfront Road	Centennial Road Overpass Only
Zone 1 Centerm West	Waterfront Road to Main St	Waterfront Road to Main St / Waterfront Rd & Centennial Rd Overpass to Clark Dr Overpass	Waterfront Road to Main St
Zone 2 Centerm East	Heatley Ave Overpass / Centennial Rd to Clark Dr Overpass.	Waterfront Rd to Main St Overpass / Centennial Rd Overpass to Clark Dr Overpass	Centennial Rd Overpass to Clark Dr Overpass
Zone 3 Lantic & SRY	Heatley Ave Overpass / Centennial Rd to Clark Dr Overpass	Centennial Rd Overpass to Clark Dr Overpass	Centennial Rd Overpass to Clark Dr Overpass
Zone 4 AGT	Heatley Ave Overpass / Centennial Rd to Clark Dr Overpass	Centennial Rd Overpass to Clark Dr Overpass	Centennial Rd Overpass to Clark Dr Overpass
Zone 5 Vanterm	Clark Dr Overpass / Centennial Rd to Heatley Ave Overpass / Stewart St to Commissioner St & McGill St Overpass	Clark Dr Overpass / Centennial Rd Overpass & Stewart St to Commissioner St & McGill St Overpass	Clark Dr Overpass / Stewart St to Commissioner St & McGill St Overpass
Zone 6 Remainder of the south shore	Stewart St to Clark Dr Overpass / Commissioner St & McGill St Overpass	No Change	No Change

Figure 6 shows the potential emergency evacuation routed from the south shore.

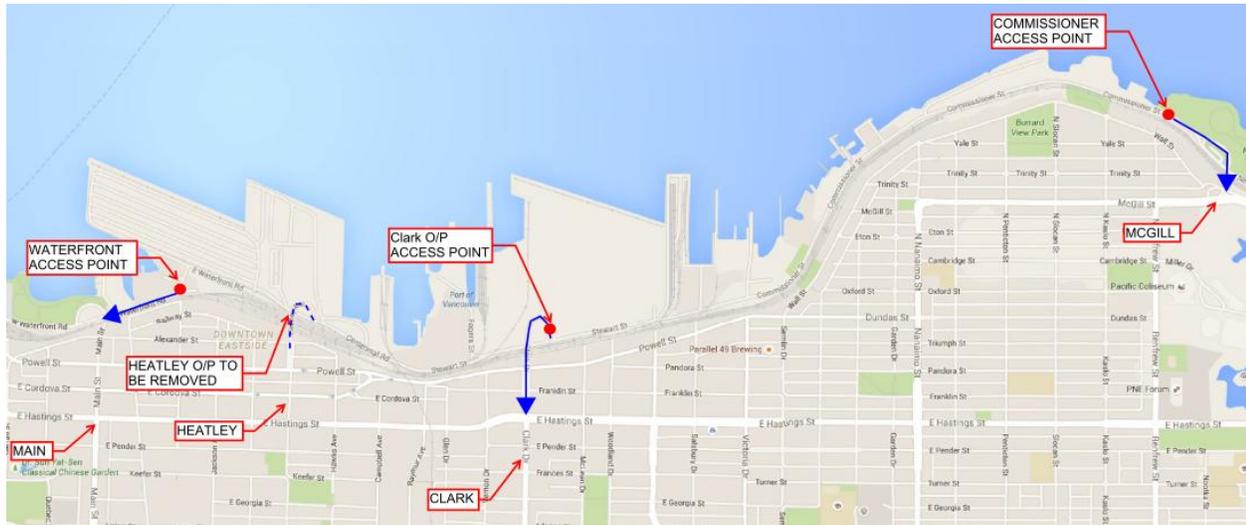


Figure 6: Emergency Egress Points

Multiple evacuation routes are present, with exiting vehicles able to take an at-grade route to Main St (assuming no train blockages) to egress the south shore.

There are reduced egress options for Centennial Road Overpass due to no at-grade link proposed under the structure connecting Rogers St westwards towards Centerm. Therefore egress route for Zones 3 & 4 are restricted to a single route, putting strain on the Clark Drive Overpass.

If the proposed Waterfront Road at-grade link is removed from the Centennial Road Overpass option, this further limits the westward connectivity for egress, pushing greater volumes towards Clark Drive for egress. As a result the egress route for Zones 2 to 4 becomes restricted to Clark Drive only.

It may be possible to enact emergency protocols to facilitate passage of vehicles through Centerm to Dunlevy Ave and Waterfront Rd; however due to security concerns and CBSA restrictions, this would likely be limited to Centerm personnel only to be effective.

9. Emergency Policies

Emergency policies currently in place with both the terminal and the Port, are not expected to change significantly as a result of the introduction of a replacement overpass for the Heatley Ave Overpass. Changes in port access points and routing will need to be communicated to the emergency services to allow appropriate alterations to the routing of emergency vehicles.

10. Constructability Issues

The timing of the introduction of the selected replacement overpass has schedule considerations to consider when reviewing their constructability.

10.1 Centennial Road Overpass

This overpass would be constructed on a constrained corridor bounded by existing operating rail tracks. As a result, its construction will be challenging to the existing road network, as well as the emergency services.

Centennial Road overpass should be scheduled ahead of the removal of Heatley ave Overpass to allow the routing of vehicles (both commercial and emergency) to the terminal entrance area (Zone 2) using the Heatley Ave Overpass. Once the Centennial Road Overpass is operational, Heatley Ave Overpass can be demolished and the terminal expansion works, which require its removal, can be completed.

11. Recommendations

The removal of Heatley Ave Overpass poses a potential impact to the response time for emergency services attending the port lands. This is due to rerouting via other south shore access points, and passage through port lands over multiple railway crossings.

This can be mitigated through the introduction of an overpass in the vicinity of the Centerm terminal entrance which would replicate the connectivity of the Heatley Ave Overpass once it is removed.. This proposed overpass would connect Centennial Rd eastward to Clark Drive, spanning the busy railway crossings of AGT and Vanterm..

There is minimal difference (approximately 6.6% deviation) between the anticipated response times for emergency vehicles attending the south shore port area whether they are accessing via the existing Heatley Overpass, or via Clark Dr and a proposed Centennial Rd Overpass, As a result, the proposed Centennial Road overpass would be an appropriate replacement for the Heatley Ave Overpass following its removal.

The proposed replacement overpass provides a relatively minor difference in access to the adjacent area compared to the existing Heatley Ave Overpass, thus, is equally rated which considering overall access connectivity.

With regard to a proposed roadway linking Waterfront Road and Centennial Road, there is almost no difference for emergency vehicles access response times to the south shore without this linkage in place when compared to Centennial Road Overpass with a Waterfront Road extension included. However, the reduced connectivity may pose an increased risk of a congested evacuation route in emergency situations.

Appendix A: Emergency Service Access Map



CENTERM WEST

CENTERM EAST

ROGERS SUGAR & SRY

AGT

VANTERM

NEW BRIGHTON RD & COMMISSIONER ST.

1

2

3

4

5

6

BURRARD INLET

BURRARD INLET

ZONE 1 EMERGENCY INCIDENTS

Incidnet:	2013	2014
Medical	0 (0%)	0 (0%)
Hazmat	0 (0%)	0 (0%)
Fire	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)
Total	0	0

ZONE 2 EMERGENCY INCIDENTS

Incidnet:	2013	2014
Medical	3 (16%)	0 (0%)
Hazmat	0 (0%)	0 (0%)
Fire	0 (0%)	0 (0%)
Other	1 (4%)	6 (26%)
Total	4	6

ZONE 3 EMERGENCY INCIDENTS

Incidnet:	2013	2014
Medical	2 (11%)	0 (0%)
Hazmat	0 (0%)	0 (0%)
Fire	0 (0%)	0 (0%)
Other	9 (38%)	5 (22%)
Total	11	5

ZONE 5 EMERGENCY INCIDENTS

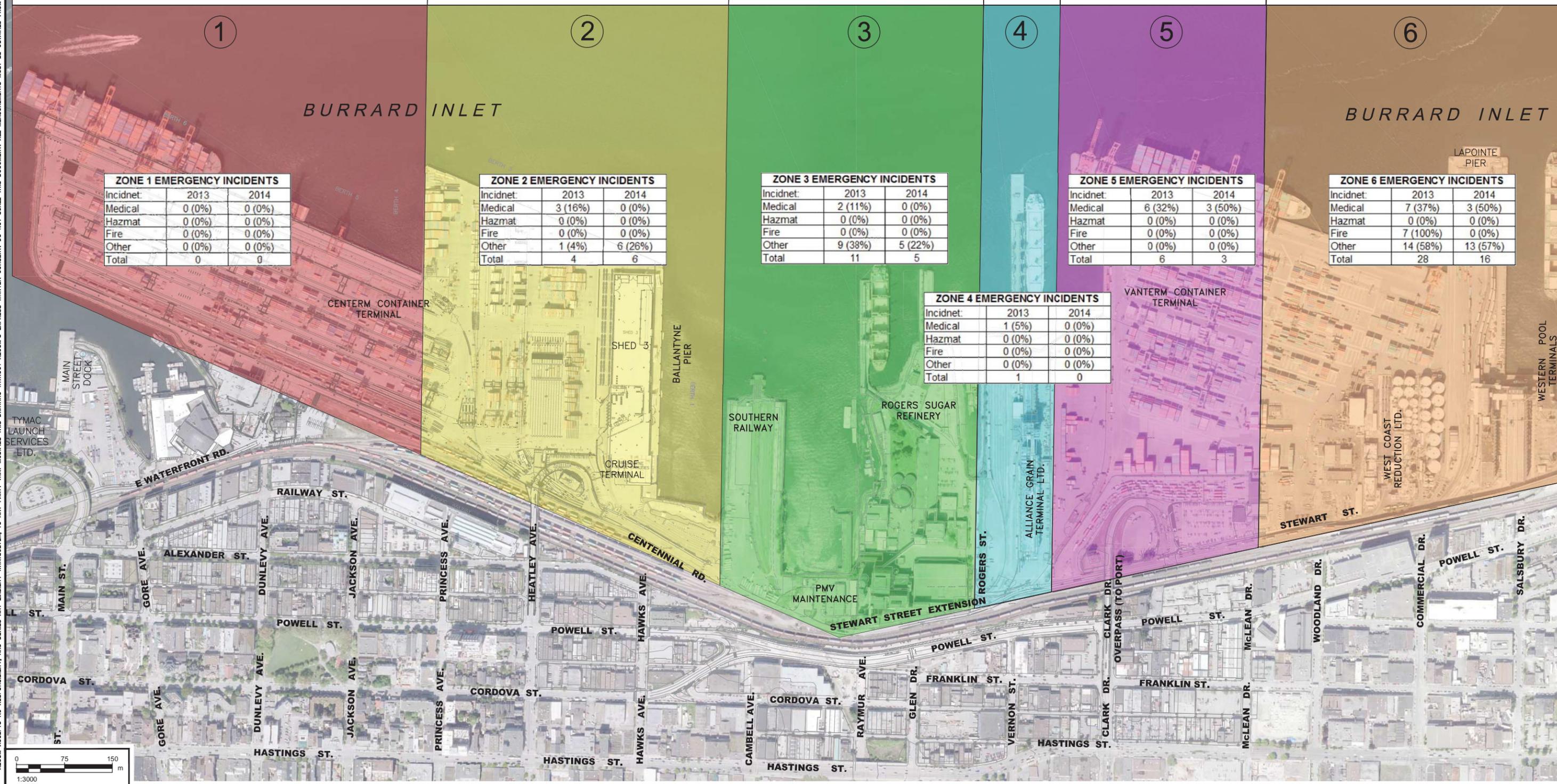
Incidnet:	2013	2014
Medical	6 (32%)	3 (50%)
Hazmat	0 (0%)	0 (0%)
Fire	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)
Total	6	3

ZONE 6 EMERGENCY INCIDENTS

Incidnet:	2013	2014
Medical	7 (37%)	3 (50%)
Hazmat	0 (0%)	0 (0%)
Fire	7 (100%)	0 (0%)
Other	14 (58%)	13 (57%)
Total	28	16

ZONE 4 EMERGENCY INCIDENTS

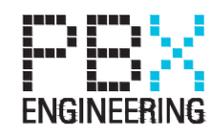
Incidnet:	2013	2014
Medical	1 (5%)	0 (0%)
Hazmat	0 (0%)	0 (0%)
Fire	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)
Total	1	0



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No.	Date	REVISION	Dr'n	Ch'd
0	2016-01-11	FOR INFORMATION ONLY	AY	NS



LEAD CONSULTANT



DESIGN BY	AY
DRAWN BY	AY
APPROVED	NS
DATE	2016-01-11
SCALE	AS NOTED
PMV SITE	32-481

CENTENNIAL ROAD OVERPASS PROJECT
PROJECT OVERVIEW
SITE PLAN

SK-20160111-001

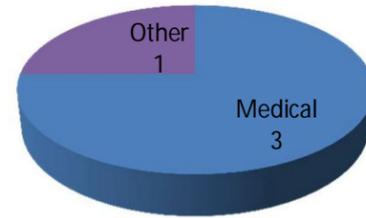
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Zone 1 (2013)

- Medical
- Hazmat
- Fire
- Other

Zone 2 (2013)

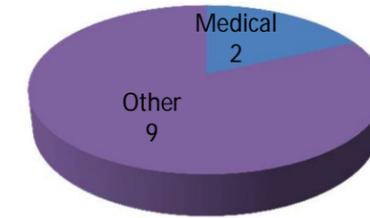
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- Hazmat 0



- Medical
- Hazmat
- Fire
- Other

Zone 3 (2013)

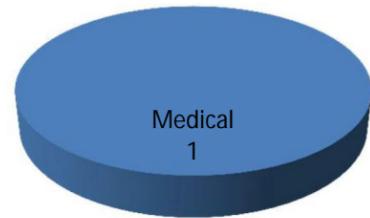
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- Fire 0



- Medical
- Hazmat
- Fire
- Other

Zone 4 (2013)

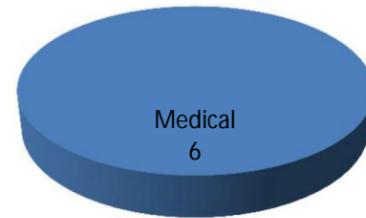
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- Other 0
- Fire 0



- Medical
- Hazmat
- Fire
- Other

Zone 5 (2013)

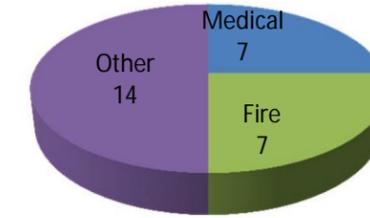
- Hazmat 0
- Other 0
- Fire 0



- Medical
- Hazmat
- Fire
- Other

Zone 6 (2013)

- Hazmat 0



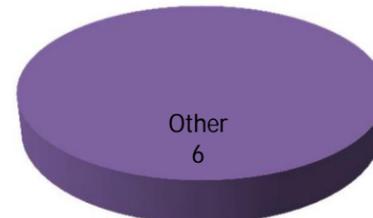
- Medical
- Hazmat
- Fire
- Other

Zone 1 (2014)

- Medical
- Hazmat
- Fire
- Other

Zone 2 (2014)

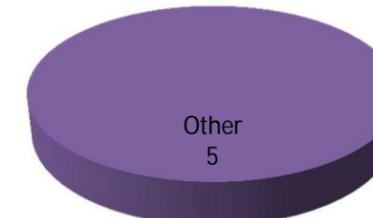
- Hazmat 0
- Medical 0
- Fire 0



- Medical
- Hazmat
- Fire
- Other

Zone 3 (2014)

- Medical 0
- Fire 0
- Hazmat 0



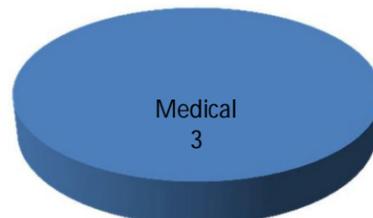
- Medical
- Hazmat
- Fire
- Other

Zone 4 (2014)

- Medical
- Hazmat
- Fire
- Other

Zone 5 (2014)

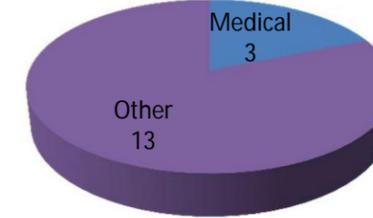
- Fire 0
- Hazmat 0
- Other 0



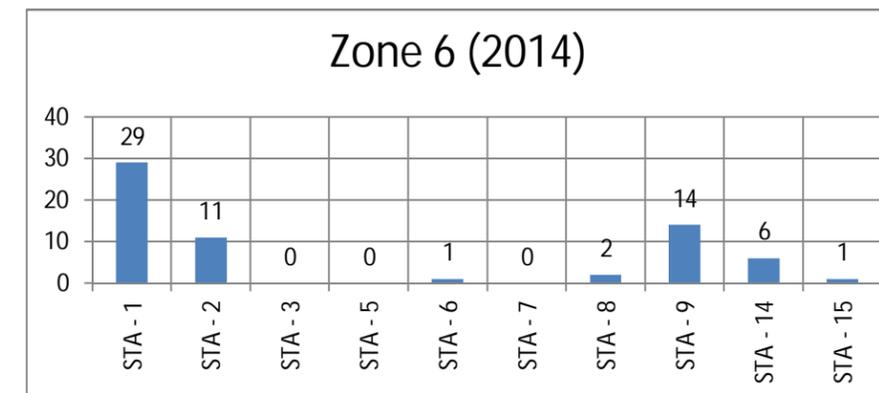
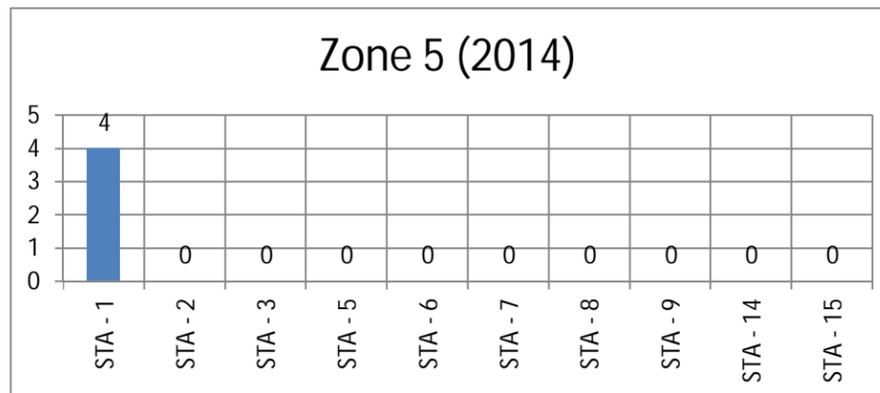
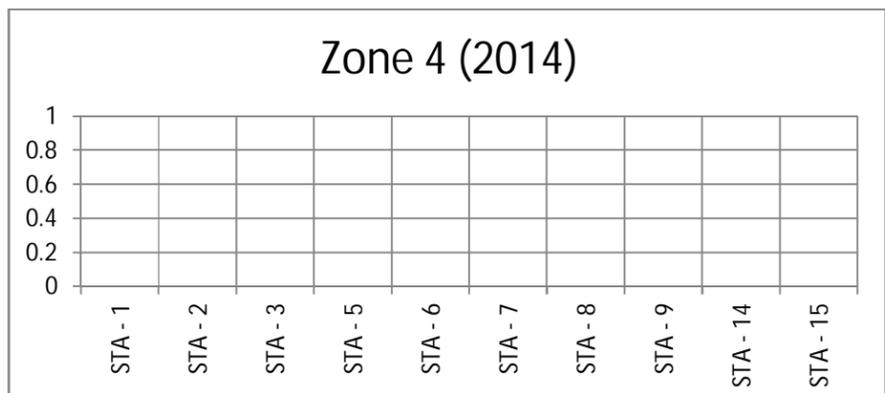
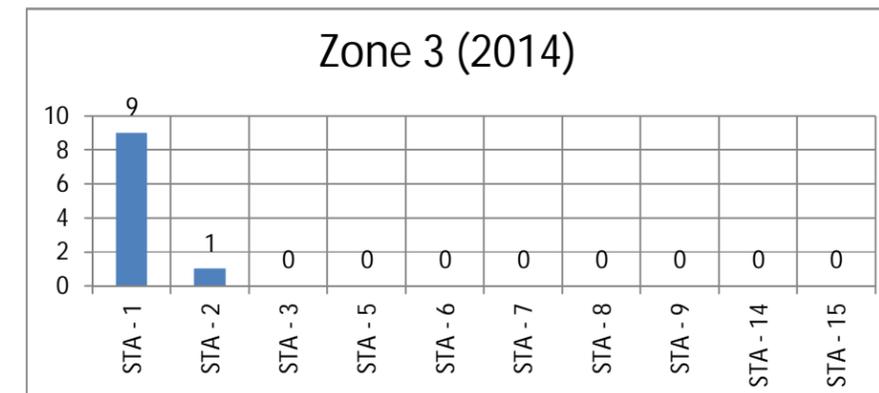
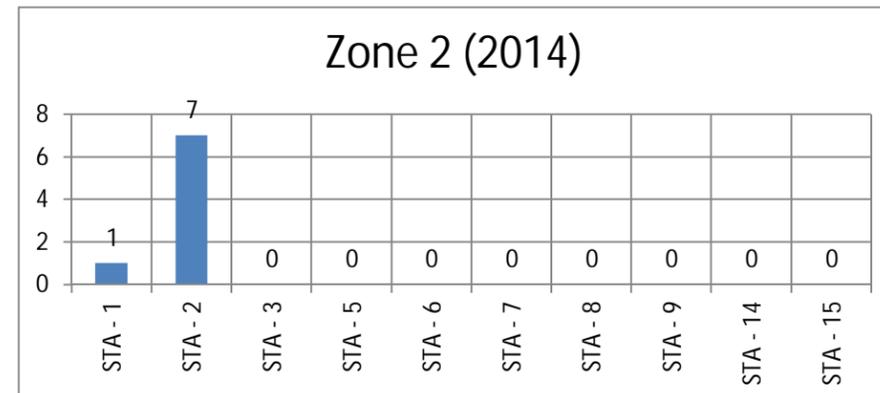
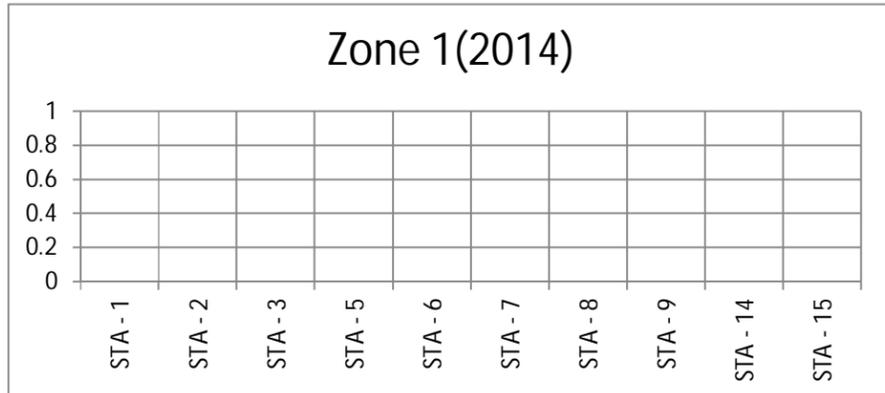
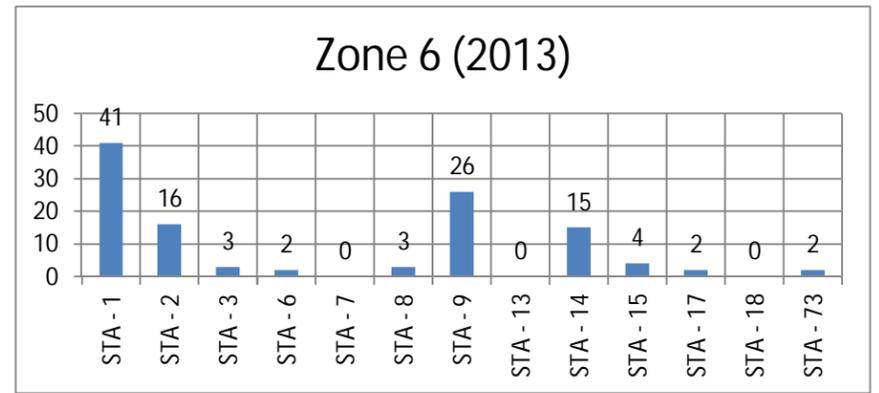
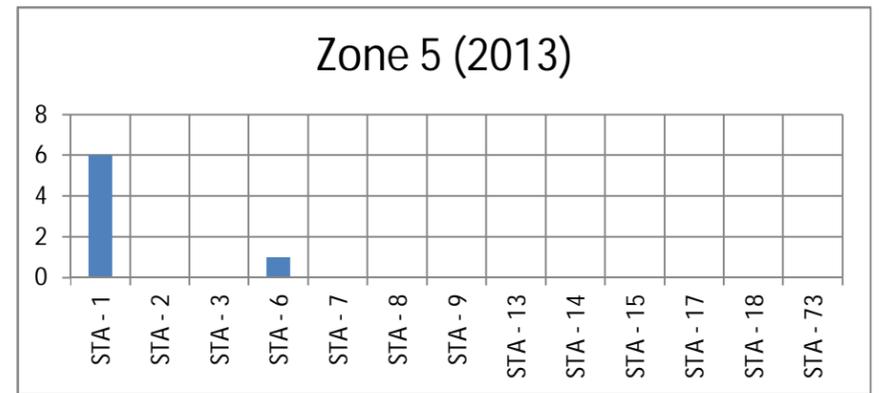
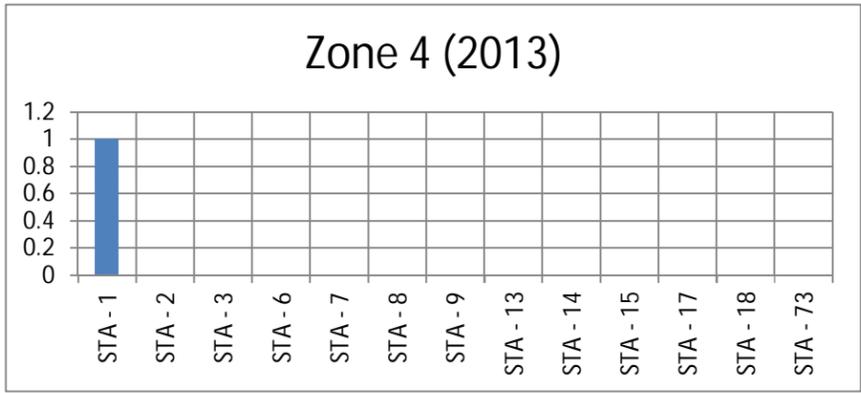
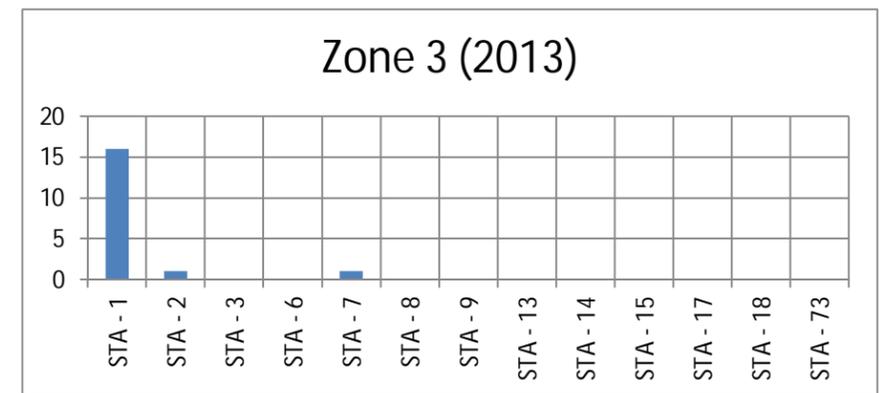
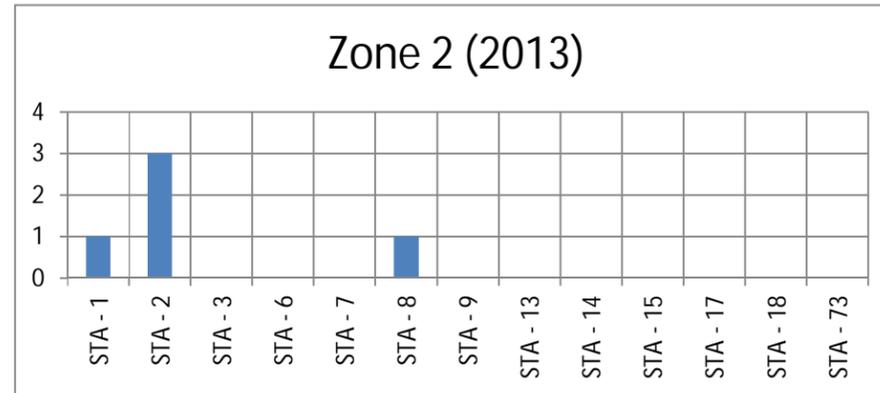
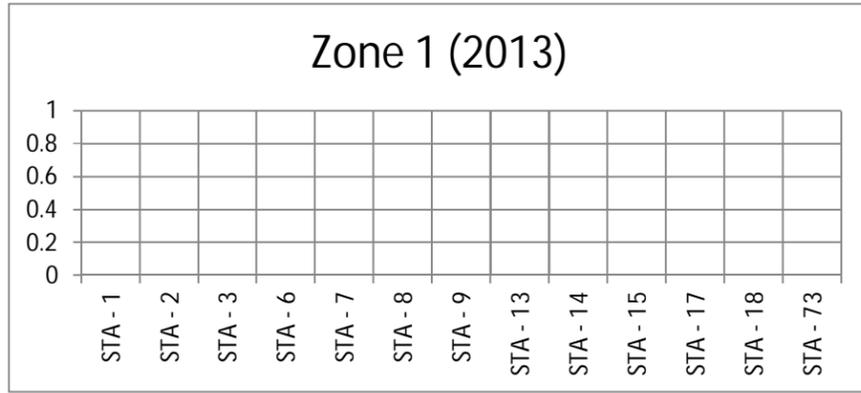
- Medical
- Hazmat
- Fire
- Other

Zone 6 (2014)

- Fire 0
- Hazmat 0



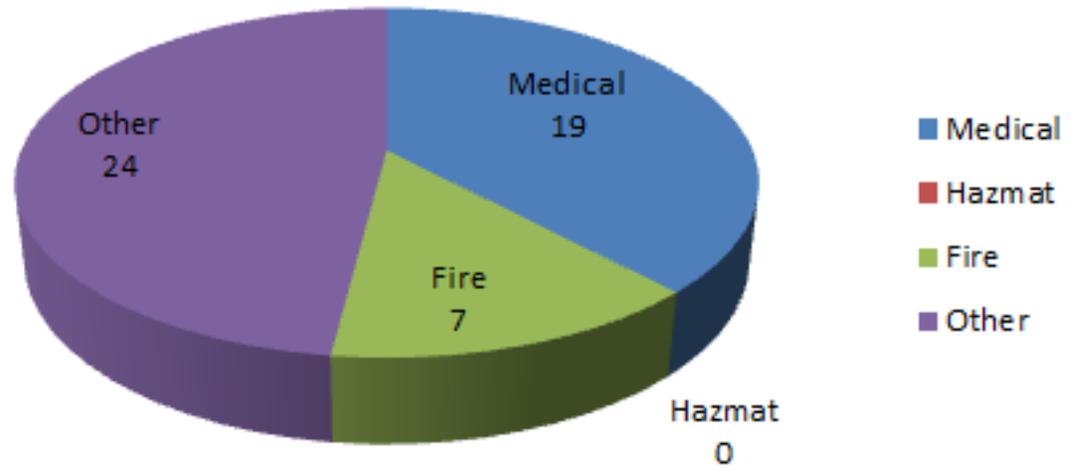
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- Fire
- Other



TOTAL NUMBER OF EMERGENCY INCIDENTS:

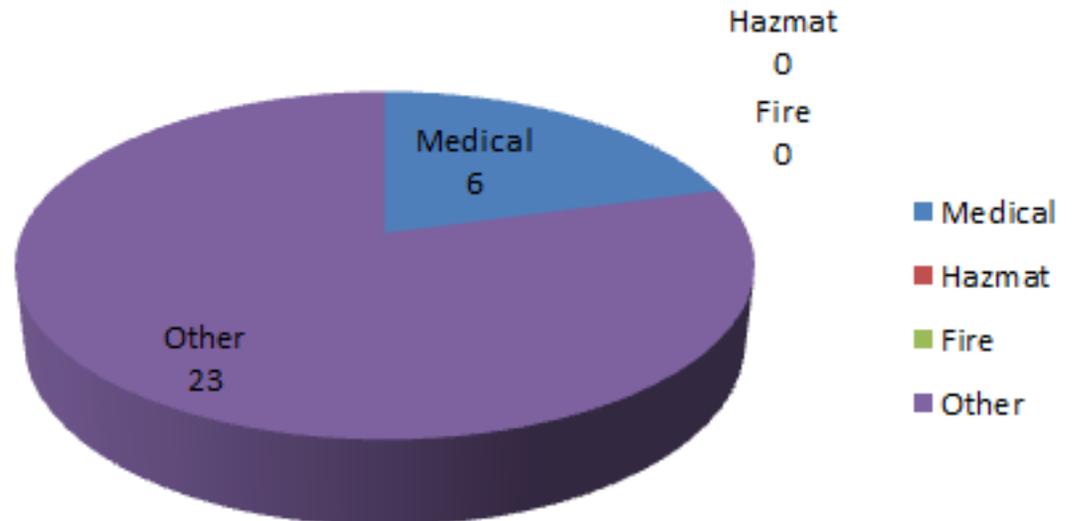
2013 Emergency Incident	
Total number of incidents	50
Cancelled *	1
Alarm *	22
Fire	7
Hazmat	0
Medical	19
MVI *	0
Other Fire *	0
Public Assist *	0
Tech Rescue *	0
Unfounded *	1
* included as "Other" category	

2013 Emergency Incident



2014 Emergency Incident	
Total number of incidents	30
Cancelled *	6
Alarm *	14
Fire	0
Hazmat	0
Medical	6
MVI *	1
Other Fire *	0
Public Assist *	2
Tech Rescue *	0
Unfounded *	0
* included as "Other" category	

2014 Emergency Incident



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