



December 22, 2014

Michael McGovern, Town Manager  
Town of Cape Elizabeth  
320 Ocean House Road  
Cape Elizabeth, ME 04107

Re: Town of Cape Elizabeth Transfer Station Safety Assessment

Dear Mr. McGovern:

On behalf of the Town of Cape Elizabeth, Woodard & Curran has prepared the following safety assessment for the Town's transfer station, located at 21 Dennison Drive. Although the Town had proposed to the Town Council that a comprehensive Solid Waste Disposal Option analysis be conducted in the spring of 2015, the tragic accident that occurred on November 24, 2014 prompted the Town to take immediate action with a facility safety review.

Woodard & Curran engineers Randy Tome and Megan McDevitt conducted the transfer station safety assessment. Randy Tome is a licensed professional engineer with over 26 years of civil engineering experience on a variety of solid waste and civil/site development projects. Randy has been involved in the design of multiple transfer stations and recycling centers throughout the state, including transfer stations in Harpswell, Winthrop, Wiscasset, Ogunquit, Gray, Casco, Yarmouth and Harrison. Megan McDevitt is a licensed professional engineer with over seven years of both civil and structural engineering experience on public and private projects. Megan's experience includes the review and design of facilities for compliance with building and safety regulations such as Occupational Health and Safety Administration (OSHA) and International Building Code (IBC).

This letter summarizes Woodard & Curran's safety review of the transfer station, including general observations made of the daily operations at the facility, and provides possible alternatives to the current operations with the intent of increasing the overall safety at the transfer station.

### **Facility Background**

The Cape Elizabeth transfer station opened in 1978 adjacent to an existing construction and demolition debris (CDD) landfill. In 1995, the CDD landfill was closed and improvements were made to the transfer station, including realignment of the loop road and construction of a retaining wall for overhead roll-off containers, concrete pads for the existing silver bullets, areas for leaf and yard waste disposal, and the Swap Shop Building. As outlined in the transfer station operations manual, the facility operates the solid waste drop-off program by having users back their vehicles into one of three parking spaces in the compactor building. Next, they unload and throw their solid waste into the compactor, exit the building, drive counter-clockwise around the loop road to drop-off cardboard and/or bulky waste at the appropriate locations, and then visit the Swap Shop or exit the facility.

In 2003, the Town created the *Refuse Materials Planning Committee* to review the facility. In general, the committee found that residents and Town officials agreed that the facility operated efficiently. No substantial improvements were deemed necessary or desirable at that time.



### Code Review with SafetyWorks!

- Woodard & Curran contacted SafetyWorks! on December 11, 2014 to verify the most current regulations and safety inspection protocol. SafetyWorks! is a division of the Maine Department of Labor providing free consultation, upon request, for Maine's public-sector workplaces.

From our discussions with SafetyWorks! Woodard & Curran has confirmed the following:

- The Maine Department of Labor is responsible for enforcing occupational health and safety regulations in the public sector. Their responsibilities include responding to situations of imminent danger, employee fatalities and hospitalizations, employee-written complaints, and performing worksite inspections.
- SafetyWorks! evaluates a workplace for compliance with Maine Department of Labor health and safety standards with respect to the employer and employee relationship. They do not evaluate a workplace for user safety; that is Woodard & Curran's role for this safety assessment.

Woodard & Curran understands from the Town that SafetyWorks! last performed a courtesy inspection of the facility in 2010. On December 5, 2014, the Town requested SafetyWorks! perform another courtesy inspection. SafetyWorks! performed the courtesy inspection on December 19<sup>th</sup>, 2014; the Town anticipates receiving the final inspection report soon.

### Site Visit

Woodard & Curran engineers met with Public Works Director, Bob Malley, on December 3, 2014 and discussed the history of the transfer station, current operations, and the circumstances regarding the tragic accident. Woodard & Curran then visited the transfer station with Mr. Malley and observed vehicular and pedestrian movement within the facility. Woodard & Curran revisited the transfer station with a member of its Health & Safety Department on December 13, 2014 to observed vehicle and pedestrian movements during a time period historically known for high user volume.

### General Transfer Station Observations

Woodard & Curran made the following observations of the facility operations and users (residents and commercial haulers) during multiple site visits to the Cape Elizabeth transfer station:

1. Vehicle and Pedestrian Traffic at Compactor: Generally, the facility operates with the majority of users backing their vehicle into the compactor building to unload solid waste into the compactor. Some users drive forward into the compactor building, most likely due to being uncomfortable with backing into the building. However, during times of high volume, some users park outside the compactor building and walk their solid waste into the compactor building; to accomplish this, users park either next to the compactor building or on the grassed island in the interior of the loop road.

During the December 13<sup>th</sup> Saturday morning site visit, Woodard & Curran observed 57 users drop-off solid waste into the compactor. The users dropped off their solid waste in the following manner:

- 38 users (67%) backed their vehicle into the compactor building;
- 4 users (7%) drove their vehicle forward into the compactor building; and
- 15 users (26%) parked outside the compactor building and walked their solid waste to the compactor.



It was observed during the site visits that the mixing of vehicle and pedestrian traffic within the compactor building and on the loop road causes significant congestion, increasing the risk of an incident. Also, the unrestricted flow of traffic allowing for multiple vehicles to travel in either forward and reverse directions within the same space adds to the congestion and increases the risk of a possible incident.

2. Fall and Vehicle Protection at Compactor: There is a steel pipe bumper in front of the compactor to prevent vehicles from backing into the compactor. It is Woodard & Curran's understanding that this barricade worked appropriately in preventing the vehicle from driving into the compactor during the November 24<sup>th</sup> accident. There is also a chain link gate installed to protect residents from falling into the compactor; residents must lift their solid waste over the chain link gate when disposing of solid waste into the compactor. The required fall protection height per both OSHA and IBC is 42-inches high and the compactor barricade meets that height requirement. However, Woodard & Curran observed several users standing in the bed of their pickup trucks to throw solid waste into the compactor; standing on the bed of the pickup truck elevates the user above the satisfactory fall protection height.
3. Cardboard Container Location: During the December 3<sup>rd</sup> site visit, the cardboard containers were located close to the interior of the loop road. Users stopping at the cardboard container for drop-off were parking and walking close to the facility's main flow of traffic around the loop road. During the December 13<sup>th</sup> site visit, the cardboard containers were observed to be located farther away from the interior of the loop road, closer to the leaf and yard waste drop-off area. This container location provided more distance and safety between the users and vehicles utilizing the cardboard containers and the main flow of vehicle traffic around the loop road.
4. Fall Protection at the Overhead Container Retaining: There is approximately a 44-inch vertical change from the top of the retaining wall to the ground below. Currently, the walls of some of the overhead roll-off containers extend above the top of the retaining wall to provide some protection for users from falling into the containers; however, no fall protection is provided at the open space between the containers along the retaining wall. Additionally, fall protection of the container walls is eliminated if there is a gap between the containers and the retaining wall or if the containers are removed from the retaining wall.

### **Assessment**

It should be noted that nearly all municipal transfer stations/recycling facilities, by their nature, consist of a large number of pedestrians and vehicles sharing the same relatively small amount of space. Overall, the public's safety record at the Cape Elizabeth transfer station has been satisfactory and is a testament to the patience, consistent mode of operations, slow speeds, and overall attentiveness of the employees and facility users. Initial indications are that the recent tragic accident appears to be more the result of vehicle operator error and traffic accident rather than a transfer station design or facility operation error. Thirty-seven years of operation without another serious accident speaks to a reasonable facility layout and design combined with good cooperation from the public as a whole.

With the above information as a background, there are usually areas for improvement at any individual facility. Woodard & Curran has evaluated several alternative traffic patterns for access to the compactor building with the intent of reducing pedestrian and vehicle congestion and improving overall safety. The following conceptual layouts were developed utilizing the existing loop road and compactor building



location; no major changes to the facility layout are recommended at this time. Since the implementation of additional safety measures could have a direct impact on the efficiency of the facility, each alternative has been evaluated for both the safety and level of service advantages and disadvantages to the facility.

Alternative 1 – Back-in Access for Compactor: This alternative allows users to continue to back into the compactor building to drop-off solid waste; however, this alternative recommends the installation of a stop light and stop line to restrict drop-offs to only one user at a time. A physical barrier is recommended to provide for two travel lanes: a compactor lane and a compactor by-pass lane. The physical barrier, individual lanes, and additional “No Parking” signs along the loop road interior grassed island will discourage users from parking outside the compactor building and walking their solid waste into the compactor building. Below is a conceptual layout of this alternative.



The following table outlines both the safety and level of service advantages and disadvantages of this proposed facility alternative.

**Alternative 1: Evaluation of Back-in Access for Compactor**

<b>Safety</b>	<u>Advantages</u>
	<ul style="list-style-type: none"> <li>• Eliminates the congestion of vehicles and pedestrians both within the compactor building and on the loop road.</li> <li>• Provides dedicated traffic flow patterns, reducing vehicle congestion within the loop road.</li> <li>• Eliminates pedestrian crossing within vehicle travel lanes.</li> </ul>
	<u>Disadvantages</u>
	<ul style="list-style-type: none"> <li>• Does not eliminate the fall risk associated with users standing in pickup truck beds adjacent to the compactor.</li> </ul>



*Level of Service*

Advantages

- Continues to allow users to back-up close to the compactor to drop-off solid waste, meaning users only have to transport solid waste a small distance and is practical for users with heavy loads.

Disadvantages

- Reduces the number of vehicles accessing the compactor at one time from three to one, most likely creating a long vehicle queue possibly extending down Dennison Drive during times of high user volume.
- Likely increases user frustration due to decreased efficiency at the compactor building.

Since it is anticipated that this alternative will decrease the level of service of the facility, it is recommended that commercial haulers either be prohibited from use of the transfer station or restricted to use only outside the high user volume periods. Commercial haulers drop-off large solid waste loads, requiring more time at the compactor than the average facility user. Eliminating or restricting commercial hauler use will improve the overall efficiency of this alternative.

Alternative 2 – Diagonal Parking Access for Compactor: This alternative does not allow users to back into the compactor building, but instead allows them to park in front of the compactor building. As with the previous alternative, a physical barrier is recommended to allow for two travel lanes. The compactor lane will have dedicated parking spaces, marked with pavement striping similar to an angled parking lot, for users to park their vehicle and walk their solid waste into the compactor building. The users will then pull their vehicle out of the parking space and merge into the compactor by-pass lane. The physical barrier, individual lanes, and additional “No Parking” signs along the loop road interior grassed island will discourage users from parking outside of the marked parking spaces and walking their solid waste into the compactor building from other locations. Physical barriers are also recommended in front of the compactor building to prevent vehicles from backing in. Below is a conceptual layout of this alternative.



The following table outlines both the safety and level of service advantages and disadvantages of this proposed facility alternative.

**Alternative 2: Diagonal Parking for Compactor Access**

<b>Safety</b>	<p><u>Advantages</u></p> <ul style="list-style-type: none"> <li>• Eliminates the congestion of vehicles and pedestrians both within the compactor building and on the loop road.</li> <li>• Provides dedicated traffic flow patterns with vehicles traveling only in a forward direction, reducing overall vehicle congestion within the loop road.</li> <li>• Eliminates the fall risk associated with users standing in pickup truck beds adjacent to the compactor.</li> </ul> <p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>• Requires pedestrian crossing of a single vehicle traffic lane, similar to a parking lot scenario.</li> </ul>
<b>Level of Service</b>	<p><u>Advantages</u></p> <ul style="list-style-type: none"> <li>• Increases the number of vehicles accessing the compactor at one time from three parking spaces currently within compactor building to four parking spaces in front of the compactor building.</li> </ul> <p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>• Eliminates the convenience of backing up to the compactor; users will be required to carry solid waste from their vehicle to the compactor over a longer distance and is not as practical for users with heavy loads.</li> </ul>

Since backing in would not be permitted in the alternative, it is recommended that commercial haulers be discouraged from use of the transfer station. It is anticipated that commercial haulers would travel back and forth between their vehicle and the compactor multiple times to dispose of their large loads of solid waste, resulting in many more trips than the average



facility user would undertake. Eliminating commercial haulers will improve the overall safety and efficiency of this alternative.

Alternative 3 – Drive-Along Access for Compactor: This alternative also does not allow users to back into the compactor building, but instead drive and park in the front of the compactor building. In this alternative, three lanes will be striped: two compactor drop-off lanes and a compactor by-pass lane. Residents will be able to park in either of the compactor drop-off lanes and walk their solid waste into the compactor building. With this alternative, “No Parking” signs are recommended along the loop road interior grassed island, and physical barriers are recommended in front of the compactor building to prevent vehicles from backing in. Below is a conceptual layout of this alternative.



The following table outlines both the safety and level of service advantages and disadvantages of this proposed facility alternative.

### Alternative 3: Drive-Along for Compactor Access

<b>Safety</b>	<p><u>Advantages</u></p> <ul style="list-style-type: none"> <li>• Eliminates the congestion of vehicles and pedestrians within the compactor building.</li> <li>• Provides dedicated traffic flow patterns with vehicles traveling only in a forward direction, reducing overall vehicle congestion within the loop road.</li> <li>• Eliminates the fall risk associated with residents standing in pickup truck beds adjacent to the compactor.</li> </ul> <p><u>Disadvantages</u></p> <ul style="list-style-type: none"> <li>• Requires pedestrian crossing of vehicle traffic lanes.</li> </ul>
	<p><u>Advantages</u></p> <ul style="list-style-type: none"> <li>• Allows multiple vehicles from the two compactor drop-off lanes to access</li> </ul>
<b>Level of Service</b>	



the compactor at one time as compared to three parking spaces currently provided within compactor building.

Disadvantages

- Eliminates the convenience of backing up to the compactor; users will be required to carry solid waste from their vehicle to the compactor over a longer distance and is not as practical for users with heavy loads.
- Potentially increases user frustration while waiting for other users to exit their particular compactor drop-off lane after they have dropped off their solid waste.

Similar to Alternative 2, it is recommended that commercial haulers be prohibited from use of the transfer station in this alternative because backing in would not be permitted. Eliminating commercial haulers will improve the overall safety and efficiency of this alternative.

In order to improve safety, each of the three alternatives described above recommends eliminating the opportunity for users to walk one or two small bags of solid waste into the compactor building. Some users may view this as a decrease in the facility's efficiency. To increase the level of service in each of these alternatives, separate solid waste container(s) could be provided at the transfer station. These containers, which would be located away from and outside the traffic patterns utilized to access the compactor building, would provide a quick and efficient disposal area for the users with only one or two bags of solid waste. The anticipated challenges associated with the addition of separate municipal solid waste containers are:

- Limited location and space available for the additional containers at the facility;
- Management of the containers' covers to reduce weather impacts (i.e., snow and rain getting in the containers); and
- Limitation on containers to provide adequate capacity during days of high user volume.

**Recommendations**

Each of the three alternatives described in the assessment above increases user safety over the current operations of the transfer station. Alternative 1 (Back-in Access) is arguably the safest option because it limits access to the compactor to only one user at the time. However, the anticipated decrease in facility efficiency for this alternative is significant and could make the facility nonfunctional. Alternative 3 (Drive-Along Access) provides adequate efficiency, but does not substantially reduce the pedestrian and vehicle congestion within the loop road. Therefore, Woodard & Curran recommends Alternative 2 (Diagonal Parking Access) as the best of the three alternatives with respect to both safety and functionality of the facility. This alternative removes vehicle and pedestrian congestion within the compactor building and provides dedicated traffic patterns requiring all vehicles to travel only in a forward direction. There is still some small risk associated with pedestrians accessing the compactor building by crossing in front of vehicles pulling into the diagonal parking spaces; however, this scenario is very similar to many parking lot situations around the community and can be very safe with proper awareness and attentiveness.

In addition to the recommended alternative to the operations at the compactor building, Woodard & Curran also recommends the installation of proper fall protection along the top of the overhead roll-off container retaining wall. OSHA regulations require fall protection be provided when a fall hazard exceeds four-feet; the existing retaining wall height does not exceed four-feet. OSHA, however, is specifically written for the safety of employers and employees. IBC regulations, which govern buildings and structures, consider all users and occupants of a facility. IBC regulations are more conservative with regard to fall protection and require fall protection whenever a fall hazard exceeds 30-inches. The



existing retaining wall height does exceed 30-inches, and therefore adequate fall protection should be provided.

In closing, any facility changes will take time for users to become acclimated. The Town will need to be prepared, and properly staffed, to communicate and then facilitate and enforce the recommended changes during the transition period. While the transition period may initially be perceived as inconvenient, it should be emphasized that the ultimate outcome is to improve safety while continuing to provide a functional facility for all users and employees.

Sincerely,

WOODARD & CURRAN

A handwritten signature in blue ink that reads "Randy Tome".

Randy Tome, PE  
Senior Vice President

A handwritten signature in blue ink that reads "Megan McDevitt".

Megan McDevitt, PE  
Project Engineer 2

RET/MDLM

cc: Robert Malley, Director of Public Works

PN: 228673