Regional Solid Waste System Study

Phase 1 Report

October 15, 2021

DRAFT FINAL

Prepared for

Environmental Health Department

JRMA
ARCHITECTS ENGINEERS

In Association with:

AKS Engineering & Forestry Inc. | Bell & Associates | Swordfish Consulting Services

Clark County

Department of Solid Waste

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Chapter 1

Introduction

1.1 Background

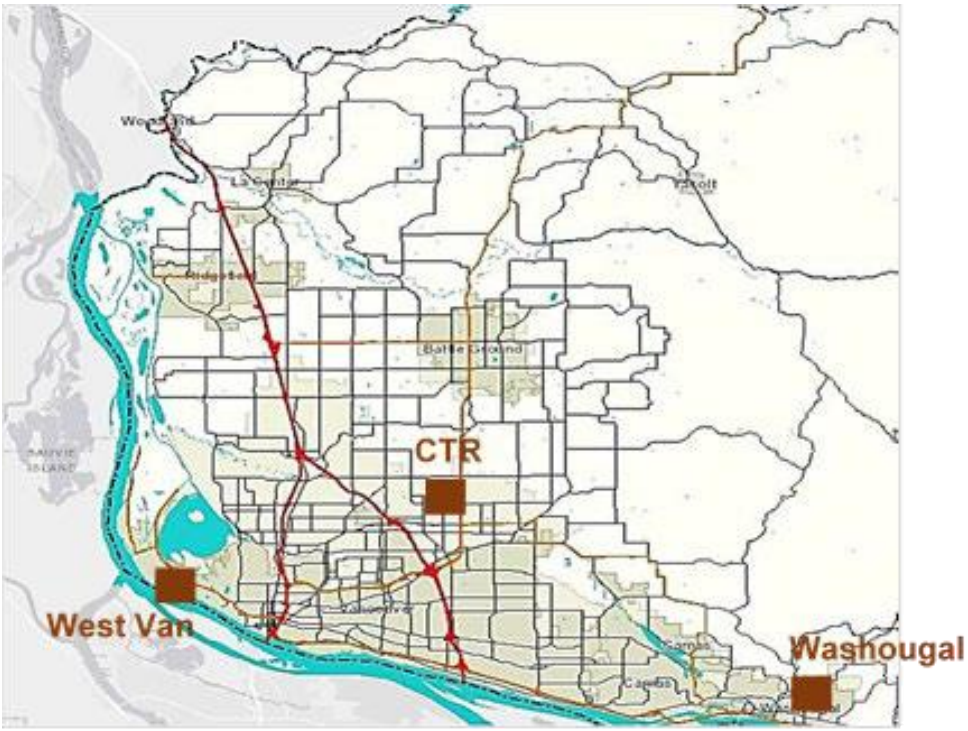
Clark County (County) is a dynamic, fast-growing area in southwestern Washington; the County population has increased 14.8% since 2010. Since the first transfer stations (i.e., West Vancouver Material Recovery Facility (MRF) and Transfer Station and Central Transfer and Recycling Center) were opened in the County in 1991, the County population has increased by 105%. There have been no major improvements to these facilities over this period. The Washougal Transfer Station was opened in 2009.

1.1.1 – Transfer Station System Summary

The transfer station's locations and a map are below:

1. **West Vancouver MRF and Transfer Station (West Van)**,located at 6601 N.W. Old Lower River Road at the Port of Vancouver
2. **Central Transfer and Recycling Center (CTR)**, located at 11034 N.E. 117thAvenue, Vancouver
3. **Washougal Recycling and Transfer Station (Washougal)**, located at 4020 GrantStreet, Washougal

Figure 1.1: Facility Map



All three facilities accept waste from private commercial haulers, route collection trucks, and public (including commercial) self-haulers. Two of the facilities, CTR and West Van, use preload compactors to transfer waste into intermodal containers. The containers are transported by semi-tractor to the Tidewater barge terminal west of the Port of Vancouver. Tidewater transports the containers up the Columbia River to the Finley Buttes Landfill near Boardman, Oregon. Waste from the Washougal Transfer Station is transported via semi-tractor-trailer to the Wasco County Landfill near The Dalles, Oregon. Both Finley Buttes and Wasco County landfills are owned and operated by Waste Connections of Washington (WCW).

These facilities are operated under an agreement between Clark County and Columbia Resource Company (CRC), a wholly-owned subsidiary of Waste Connections. The Contract with CRC was first entered into on April 11, 1991. The contract has been amended six times, most recently in 2006. The contract includes provisions for transfer, transportation, and disposal of municipal solid waste generated in the County.

In 2006, Clark County renewed the operating contract with CRC for solid waste, transfer, transport, and out-of-county disposal services. The Agreement also includes the processing of commingled recyclables utilizing the West Van MRF. The contract term was for ten (10) years, until December 31, 2016. The 2006 Agreement contained two five-year extension options and a purchase option. The first option was granted and extended the Agreement through December 31, 2021 (“First Extension” of 2006 Agreement). The County has the right to extend the Agreement (“Second Extension” of 2006 Agreement) for another five years through December 31, 2026. The County has notified CRC of their intent to extend the contract for the second 5-year period. It should be noted that the “First Extension” was more of an automatic extension triggered if CRC implemented specified capital improvements detailed in Sections 10.1 and 23.5 of the Agreement. A provision in the Agreement permits the County to exercise an option to purchase all transfer stations by notifying CRC no later than December 31, 2025.

1.1.2 – Regional Solid Waste System Study

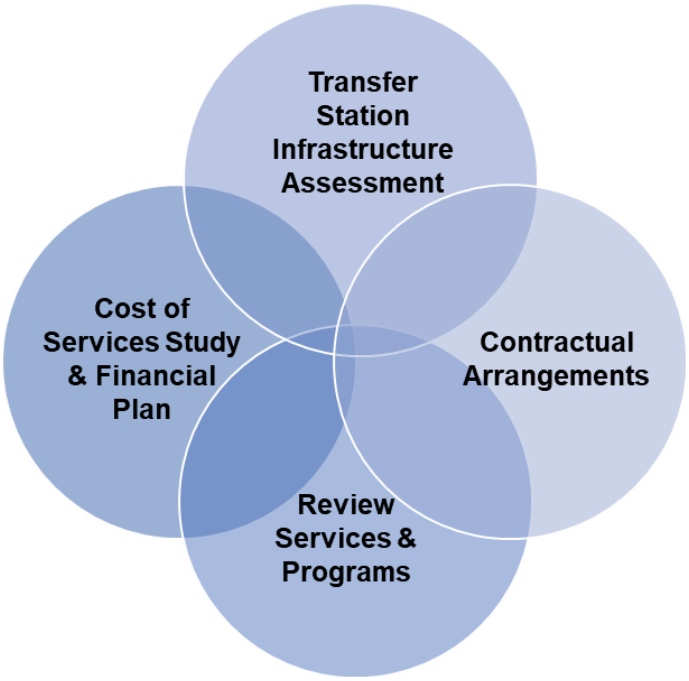
The County’s population growth coupled with the need for modernized solid waste facility infrastructure, expanded programs, and services and updated institutional (contractual) arrangements led the County to launch this Regional Solid Waste System Study (Study).

The need for the Study is also driven by state requirements (i.e., Washington Solid Waste Management, Reduction and Recycling Act (Revised Code of Washington [RCW] 70.95) to prepare a 20-year Comprehensive Solid Waste Management Plan (the Plan). The Plan must be developed in association with cities and towns located in the county and reviewed (and revised if necessary) at least every five years. The County’s last Plan update was in 2015 (see https://www.clark.wa.gov/publichealth/solid-waste-management-plan).

Figure 1.2 on the next page captures the inter-relationships of the key components of the Study. These critical, inter-related components include:

- Transfer Station Infrastructure Assessment
- Cost of Services Study & Financial Plan
- Review of Services and Programs
- Contractual Arrangements

Figure 1.2: Regional Solid Waste System Study Components



There will be three phases to the Study with this report capturing Phase 1. Phase 1 focuses on evaluating the financial position of the system, use of various rate and planning strategies to reduce traffic congestion at the transfer station facilities, completing a conditions assessment of the current transfer station, and identify infrastructure needs and options for future public ownership of the system. The goal of Phase 2 is to complete facilities planning services to determine investments needed and prepare a plan for capital improvements to the system. Phase 3 includes incorporating findings and recommendations of this Study into an update of the County's Comprehensive Solid Waste Management Plan in 2021/22.

The Clark County Environmental Health Department is responsible for oversight and management of the regional solid waste system per state laws. The County has engaged a consultant team led by J.R. Miller and Associates for the completion of the Study. The Study also reflects guidance and direction from the City of Vancouver Public Works, Solid Waste Division. The County, through interlocal agreements, has formed a Regional Solid Waste System Steering Committee (RSWSSC) made up of the Public Works Directors of each city to advise the County on solid waste issues and planning. The RSWSSC will be reviewing the Study findings along with the Solid Waste Advisory Commission (SWAC).

1.2 Purpose of the Study

The purpose of this Study is to accomplish several objectives as summarized in the graphic below.

Provide a comprehensive financial review of the cost of services for operation of facilities.

Complete a comprehensive assessment of the physical condition of existing facilities to identify necessary repairs and replacement expenses associated with continued operations.

Assess operations conditions of each facility and necessary capital investments needed to enhance existing operations and meet the demand for future services, including addressing traffic improvements at CTR to alleviate congestion.

Review current collection programs and services to determine strategies that might result in reducing self-haul traffic conditions at transfer Stations.

Identify capital improvements needed to meet future service needs and prepare a financial Plan to fund these investments

Engage the Regional partners and stakeholders to review findings and develop strategy for future development of the system.

1.3 Organization of Report

This Phase 1 Report is organized into six subsequent chapters each representing a major task in the completion of the Study. It should be noted that task reports were completed, not all in sequential order as shown below, and the contents of such reports combined to make up this Phase 1 Report. A summary of each chapter can be found below.

Chapter 2 – Waste Generation Projections
Summarizes population and waste generation and disposal trends and future forecasts. This data is critical to determine the facility capacity needs in the future.

Chapter 3 – Operational Efficiencies and Impacts from Traffic and Self-Haul
Addresses current collection services and related policies and practices that pertain to the current level of services at the transfer stations. Policy options or changes to services are analyzed that may positively influence improvements in self-haul circulation and flow at the transfer stations, particularly at CTR.

Chapter 4 – Regional Transfer Stations – Operations and Condition System Assessment
Captures the results of assessing the current transfer station and material recovery facility infrastructure. The assessment entailed examining the physical condition of the facilities and identifying repairs and replacement needs. It also examined the operating conditions for managing both current waste volumes and customers as well as assessing improvements needed to manage growth over the next 20 years.

Chapter 5 – North Area Service Options
Details results of an analysis of capital improvement options at CTR and for a new north regional transfer station.

Chapter 6 – Capital Improvements Needs Assessment and Financial Plan
Summarizes the key findings of the report regarding a set of recommendations to make necessary improvements to the regional system to meet the service needs of the system for the next 20 years. It includes an assessment of the current cost of services and revenue generated by rates to meet the financialrequirements to fund these improvements.

Chapter 7 – Feasibility Study: Materials Recovery Facility Options
Uses the results of the MRF condition assessment and presents the findings of the feasibility to installa new equipment line to process commingled recyclables collected from residential and commercial customers.

Chapter 8 – Summary of Findings and Actions
Summarizes the key findings of the Phase 1 Report and identifies the near-term actions and decisions to move forward with Phase 2 of the Regional Study.

This Phase 1 Report represents the first comprehensive review of the regional solid waste system that served the County for 30 years. It presents the information for making the system improvements needed to sustain a high level of services for managing solid waste and recyclables materials most cost-effectively.

1.4 Process for Preparing the Study

The process for completing such a thorough assessment of the operating and facility needs of the Clark County regional solid waste system required a dynamic and collaborative effort. In addition to the efforts of both the County and City of Vancouver solid waste departments, it required cooperation and participation by WCW's operations personnel and its regional engineering group. As the consultant team completed draft reports on elements of the system, these documents were reviewed by WCW staff for comments and clarifications. The consultant team then responded to these comments and incorporated any corrections as noted. This was a very cooperative process throughout.

The revised draft reports were then sent to the County and the City of Vancouver solid waste staff to review and provide comments. Once received these were discussed and the draft reports were finalized to be incorporated into this Phase 1 report.

In addition to the various chapters included in this Phase 1 report, the consultant team completed two related tasks. The first was a comprehensive review of the cost of services of each transfer station. This study broke down the unit cost to operate the facility and transport and dispose of waste. It also identified the specific administrative cost elements and costs of ancillary services such as operations of HHW and recycling drop-off centers. While the complete cost of service analysis is not included in the Phase 1 report, critical cost information was used to review services and facility needs and compare options in certain cases.

The second task completed was a review of the ownership options to be provided to the County for evaluating the alternative management strategies for the future. This includes an assessment of the risk of public ownership and operations of the facilities as well as different scenarios for operating the system under a public/private partnership. Also discussed are the options to establishing a special Disposal District under state laws (i.e., RCW 36.58.100) or some alternative form of intergovernmental partnership (e.g., Washington's Interlocal Cooperation Act, RCW 39.34.010).

Reports associated with these two tasks will be included in the Phase 2 report after findings from the Phase 1 report have been presented to the Regional Steering Committee and SWAC.

Chapter 2

Waste Generation Projections

2.1 Introduction

Clark County is one of the fastest-growing areas in Washington State. This growth has resulted in a measurable increase in the amount of waste generated and received at the regional transfer station system. This chapter details forecasted waste generation quantities to be managed by the Clark County regional system for the next 15 years. Forecasts are based on historic and future population projections provided by both the County's growth management planand the State Office of Financial Management (OFM).

2.2 Population Growth in Clark County

Clark County experienced a significant increase in population between 1990 and 2010. Table 2.1 summarizes the change during the 20 years from 1990 to 2010 when the population grew by almost 80%.

Table 2.1: Population in Clark County, WA for 1990 and 2010

Year	Population	Increase in Population
1990	238,053	
2010	425,363	79% (3.9% per year)
2019 (July)	481,857	13% (1.4% per year)

Sources: Clark County Growth Management Plan (1990 and 2010), Census.gov (2019)

As a result of the closure of the Leichner Landfill in 1992, West Van and CTR transfer stations were put into service to manage all the County's waste. Waste delivered to transfer stations is transported approximately 200 miles by barge to the Finley Buttes Landfill in Boardman, Oregon. Over this period (1990-2010, the amount of waste disposed of increased by 33% from 171,762 tons to 227,868 tons annually.

Table 2.2 on the next page shows the annual change in population for incorporated cities and the unincorporated area in Clark County as published by the OFM.

Since 2010 the population of Clark County grew by approximately 13%. Considering the growth over the past 29 years, when the primary transfer stations became operational, the County population has increased by 102%. There have been no major improvements to these facilities over this period.

Table 2.2: Population Estimates of Cities in Clark County, WA

Population Estimates										
City or Area	**2010 Census**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Battle Ground	17,571	17,780	17,920	18,130	18,680	19,250	19,640	20,370	20,890	21,520
Camas	19,355	19,620	20,020	20,320	20,880	21,210	21,810	23,080	23,770	24,090
La Center	2,800	2,835	2,985	3,015	3,050	3,100	3,140	3,195	3,320	3,405
Ridgefield	4,763	4,975	5,210	5,545	6,035	6,400	6,870	7,235	7,705	8,895
Vancouver	161,791	162,300	163,200	164,500	167,400	170,400	173,500	176,400	183,500	185,300
Washougal	14,095	14,210	14,340	14,580	14,910	15,170	15,560	15,760	16,020	16,500
Yacolt	1,566	1,585	1,605	1,615	1,620	1,620	1,655	1,715	1,780	1,805
Incorporated Areas (Cities Total)	221,941	223,305	225,280	227,705	232,575	237,150	242,175	247,755	256,985	261,515
Incorporated Areas %	52.2%	52.2%	52.2%	52.3%	52.5%	52.5%	52.5%	52.6%	53.6%	53.5%
Unincorp. Areas Total	203,422	204,695	205,970	207,795	210,225	214,670	218,835	223,245	222,515	226,985
Unincorp. Areas %	47.8%	47.8%	47.8%	47.7%	47.5%	47.5%	47.5%	47.4%	46.4%	46.5%
Clark County Total	425,363	428,000	431,250	435,500	442,800	451,820	461,010	471,000	479,500	488,500

Source: Office of Financial Management

The growth in the County has been distributed evenly between the cities, rural population centers,and the unincorporated urban growth boundary. When comparing the population distribution between the cities and the unincorporated areas from 2010-2019, the increase was 17.8% and 11.6%, respectively. The population of unincorporated Clark County comprised approximately 48% of the total County population in 2010 but has slightly decreased to 46.5% in 2019.

2.3 Waste Generated and Disposed

The 2012 CSWMP reported the amount of waste generated rose from 6.55 to 8.46 pounds per capita per day from 2003 to 2012. However,during the same period, the amount of waste disposed of in landfills decreased from 3.40 to 2.94 pounds per capita per day. This change can be primarily attributed to two factors:

- County and cities implemented waste reduction and recycling programs and services aimed at reducing waste disposed of in landfills.
- Between 2009 and 2013 there was a significant recession that slowed the economy and the waste generated. Many communities experienced a reduction of waste disposed of during this period.

Both factors are reflected in the data shown in Table 2.3.

Table 2.3: Waste Generated and Disposed in Landfills from 2003 – 2012

								Diversion		
Year	Tons Landfilled*	Tons Recycled	Tons Recovered**	Recycling Rate	Diversion Rate	Population	Pounds Per Capita Landfilled Per Day	Pounds Per Capita Recycled Per Day	Pounds Per Capita Recovered Per Day	Pounds Per Capita Generated Per Day
2003	235,284	161,295	57,192	35.5%	48.1%	379,577	3.40	2.33	0.83	6.55
2004	251,171	195,451	81,049	41.0%	55.4%	383,300	3.59	2.79	1.16	7.54
2005	265,690	224,099	95,487	38.3%	54.6%	391,500	3.72	3.14	1.34	8.19
2006	277,529	225,930	126,560	35.9%	55.9%	403,500	3.77	3.07	1.72	8.56
2007	273,619	256,105	89,300	41.4%	55.8%	415,000	3.61	3.38	1.18	8.17
2008	254,468	221,821	79,020	43.6%	52.6%	424,200	3.29	2.87	1.02	7.17
2009	231,759	241,814	52,322	46.0%	55.9%	432,999	2.93	3.06	0.66	6.66
2010	227,868	271,789	32,599	49.1%	8.0%	432,999	2.88	3.44	0.41	6.74
2011	228,719	315,918	84,166	50.2%	13.4%	428,000	2.93	4.04	1.08	8.05
2012	231,487	359,169	75,110	53.9%	11.3%	431,250	2.94	4.56	0.95	8.46

** MARR total adjusted outbound (no Metro, no Special Waste)*

Source: 2012 Comprehensive Solid Waste Management Plan

The total waste generated per capita represented in Table 2.3 is the sum of the recycled/recovered tonnage plus waste disposed of in landfills. However, there are many variables related to the amount recycled and recovered that cannot be predicted. For purposes of forecasting future waste quantities in Clark County, the waste disposed of per capita is used, instead of the total waste generated.

In 2014 many communities began to experience an increase in the amount of waste received at transfer stations and subsequently disposed of in landfills. Most of the increase is directly attributedto the economy. Another factor that contributed to increases in the amount of waste

disposed of wasthe “China Sword” that impacted markets for recycled materials. Table 2.4 shows the amount of waste received at County transfer stations and transported to a landfill for disposal over the past three years.

Table 2.4: Total Disposed Waste Tonnages

	2016	**2017**	**2018**	**3-Year Average**
Total Inbound Waste @ Transfer Station (TPY)	358,310	393,425	387,755	379,830
Estimated Population	461,010	471,000	479,500	470,504
Pounds/Capita/ Day	4.26	4.58	4.43	4.42
Pounds/ Capita/Year	***1,554***	***1,671***	***1,617***	***1,614***

From 2016 to 2018, the amount of waste disposed averaged 4.4 pounds per capita per day or 1,614 pounds per capita per year. This factor is similar to what is currently being reported in several jurisdictions in the region. For instance, in the Annual Materials Recovery report for the State of Oregon, they reported an average of 1,523 pounds per capita disposed between 2016 and 2018. Also looking back a few years before the recession they reported 1,639 pounds per capita. The State of Oregon is recognized for having consistently accurate data related to the total waste generated, disposed of, and recovered annually. The information shows the amount disposed of per capita tends to be fairly consistent year to year similar to what Clark County is reporting. It should be noted that in reviewing data prior to 2006 the amount disposed of per capita is less in Oregon. However, it is not known how accurate the data is and perhaps the level of reporting was not reliable. The most recent data is most reliable and is supported by other sources and thereforejudged to be most reliable and will be used to project how much waste the system will need to manage in the future.

2.4 Forecast of Waste Disposed

OFM is the source for projecting future population growth for jurisdictions throughout the State of Washington. Projections are made by considering several factors and by producing a range of estimates including low, medium, and high scenarios. Considering these ranges and comparing them to historical data, the medium projections appear to be most accurate and, therefore, were used for projecting future waste generation in the County.

The other factor used to project future waste quantities is how much waste will be disposed of by each person in Clark County. Table 2.3 reported in 2012 that each person generated almost 8.5 pounds each day or almost 3,100 pounds per year. The total waste generated is the sum of the waste disposed of materials recycled, and other waste diverted from disposal. Both the materials

recycled and waste diverted rely on data that may or may not be part of the municipal solid waste stream. Therefore, using the actual waste disposed of is the most accurate approach for projecting how much waste the Clark County system will need to manage in the future.

Table 2.5 shows the estimated annual quantities of waste disposed of based on the OFM populationprojections from Table 2.4 and the average per capita waste disposed of from 2016–2018. These projections assume the current waste reduction and recycling services remain active and will continue to reduce waste disposed of in landfills.

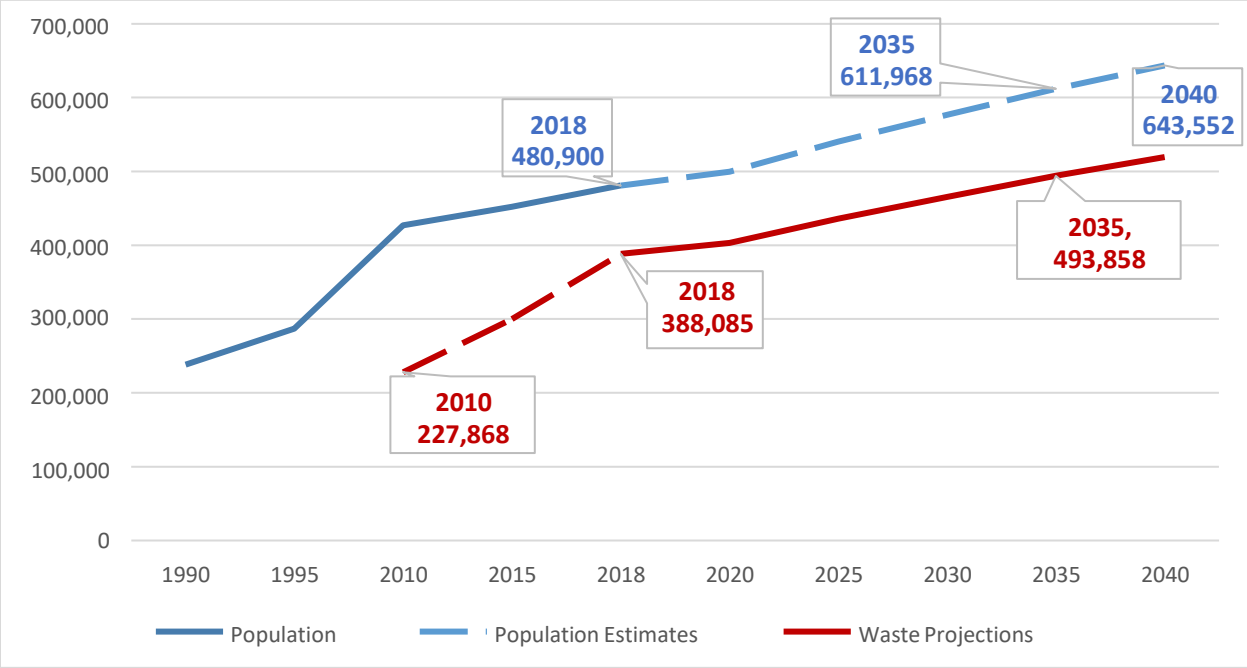
Table 2.5: Clark County Population and Waste Disposal Projections

Year	Population Estimates	Waste Projections (Tons / Year based on 1,614 lbs. per capita)
2018	480,899	388,085
2019	490,353	395,715
2020	499,400	403,016
2021	508,136	410,066
2022	516,454	416,778
2023	524,563	423,322
2024	532,508	429,734
2025	540,344	436,058
2026	547,367	441,725
2027	554,786	447,712
2028	562,186	453,684
2029	569,557	459,632
2030	576,879	465,541
2031	584,026	471,309
2032	591,154	477,061
2033	598,230	482,772
2034	605,164	488,367
2035	611,968	493,858
2036	618,455	499,093
2037	624,839	504,245
2038	631,126	509,319
2039	637,349	514,341
2040	643,552	519,346

If new programs and services are implemented, there is potential that the amount of waste received and transferred to landfills for disposal could decrease. For example, many communities are evaluating alternative technologies for converting waste into renewable energy and/or recovering more resources using advanced material recovery processes. Also, future improvements in MRF processing equipment at West Van or a new location may improve the recovery of marketable materials that could modestly decrease waste disposed of. These options could prove to be feasible but will require additional evaluation beyond the scope of this project.

Graph 2.1 illustrates the relationship of the projected population to the estimated waste quantities for the countywide system.

Graph 2.1: Population and Waste Projections



To examine the impacts of the future population in the County on the transfer station system, an analysis of where future growth is expected to occur was prepared. Table 2.6 on the next page shows that the OFM projects the population of Clark County to increase by about 132,000 people or 27.6% by 2035. The northern cities of Battleground, Ridgefield, and La Center are expected to realize about 30% of the total population growth, and Vancouver is expected to account for about 42%. The eastern cities are expected to account for 12.6% of the total population growth and the unincorporated areas just 15.5%. It is noteworthy that the County's northern cities are expected to more than double in population over the next 16 years.

The cities of Camas and Washougal in the eastern portion of the County are expected to see growth of nearly 17,000, or 41.9% of their current population. The largest growth, 55,000 people, is expected in the City of Vancouver. This is a 30% growth for the city. This growth is expected to occur both in the current city limits as well as in the urban growth area that may be annexed.

Table 2.6: Population Projections by Cities

	2018	2035	Difference	Overall Growth %	% of Total Growth
	479,500	**611,968**	**132,468**	**27.6%**	
North Cities					
Battle Ground	*20,890*	*38,443*	*17,553*		
Ridgefield	*7,705*	*25,494*	*17,789*		
La Center	*3,320*	*7,642*	*4,322*		
Total North	***31,915***	***71,579***	***39,664***	**124%**	**30%**
East Cities					
Camas	*23,770*	*34,098*	*10,328*		
Washougal	*16,020*	*22,347*	*6,327*		
Total East	***39,790***	***56,445***	***16,655***	**41.9%**	**12.6%**
City of Vancouver	**183,500**	**238,877**	**55,377**	**30.2%**	**41.8%**
Unincorporated	**222,515**	**243,103**	**20,588**	**9.3%**	**15.5%**

2.5 Waste Projections for Service Area

The transfer system currently serves three distinct parts of the County. West Van, located in the Port of Vancouver, serves the City of Vancouver and the southwest portion of the County. Due to its western-most location, it is unlikely to attract large amounts of additional waste generated by the increase in population. Located adjacent to the barge loading docks, this transfer station is a primary hub of the regional system. The facility includes the MRF for processing all commingled recyclable materials collected throughout the County. The City of Vancouver provides universal service to residents and businesses through a contract with WCW.

The Washougal transfer station serves the cities of Camas and Washougal and the unincorporated areas of east Clark County. Growth in this area has some limitations due to the physical constraints of the Columbia River on the south and the foothills of the Cascade Mountains to the northeast. CTR is located in the center of the County and serves the largest area. Figure 2.1 on the next page shows the location and the approximate service area of each transfer station. Although CTR is shown to serve the largest area of the County, the northeastern portion of Clark County is very rural and has some physical constraints for growth due to the proximity to the Cascade Mountain range.

Figure 2.1: Map of County without Annexation

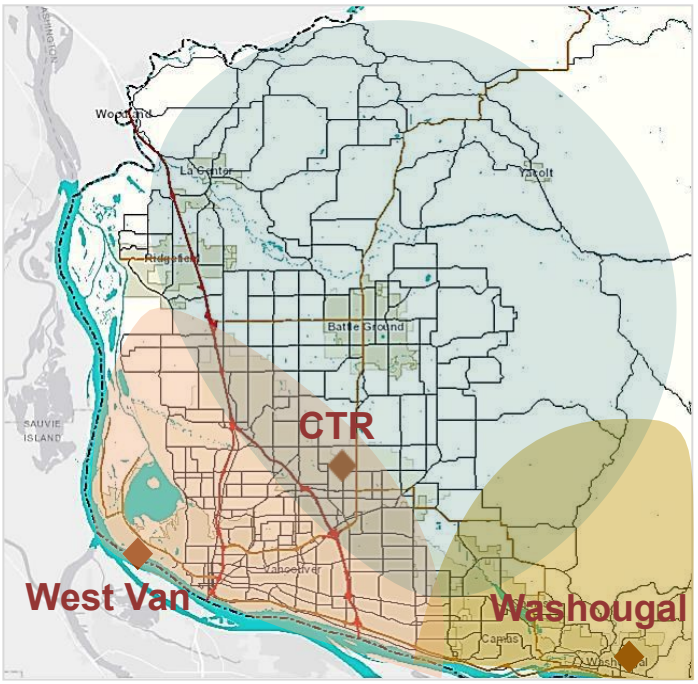
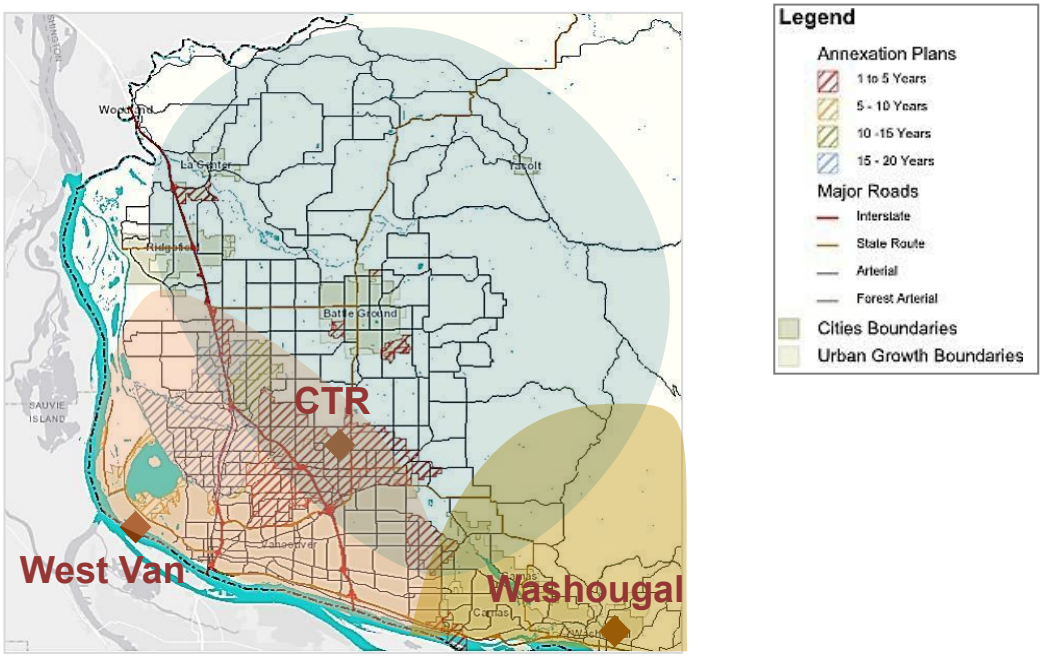


Figure 2.2 was generated from the County's growth management plan and shows the areas expected for future growth. As indicated in the legend, the cross-hatched areas are expected to experience higher density development and to be annexed over the next 15-20 years.

Figure 2.2: Map of County with Annexation



Considering the expected growth in the northern areas of the County, much of which is currently serviced by CTR, the amount of waste delivered to this facility is expected to increase significantly. As shown in Table 2.6, the County's northern cities are expected to more than double in population. The unknown is how much of the projected growth within the City of Vancouver and unincorporated County will occur in the CTR service area. There are no accurate projections of how this growth will be distributed over this area other than what is depicted in Figure 2.2, as a rough concept for the proximity of the short-haul (i.e., the distance traveled from collection routes totransfer stations).

Two scenarios were developed and are shown in Table 2.7 to estimate the impacts of population growth and the additional waste that may be anticipated for growth in delivery to each transfer station. The first scenario assumes that 50% of the future growth of the unincorporated County and the City of Vancouver will occur in the north-central portion of the County. This scenario includes the projected growth of the northern cities as shown in Table 2.6. Under this scenario, it is estimated that over 77,000 new people will locate in this area. Assuming that each person will generate 1,614 pounds of waste for disposal per year, the additional volume for this service area is over 63,000 tons per year that will need to be transported and disposed of by 2035.

The second scenario shown in Table 2.7, assumes that as much as 70% of the projected growth of the unincorporated county and the City of Vancouver will occur in the CTR service area. Under this scenario, about 92,000 new people will move into the service area, including the projected growth of the County's northern cities. This scenario would result in about 75,000 tons of additional waste that will need to be transported and disposed of annually by 2035.

Table 2.7: Estimated Population Expansion by Service Area

Transfer Station (TS) in Service Areas	Assuming 50% UGB Growth Central Area			Assuming 70% UGB Growth in Central Area		
	Population	% Change	Additional Waste (TPY)	Population	% Change	Additional Waste (TPY)
CTR Service Area						
Growth in City of Vancouver in North/Central County	27,689		22,345	38,764		31,282
Growth in Unincorporated North/Central County	10,294		8,307	14,411		11,630
Growth in North Cities	39,664		32,009	39,664		32,009
Total CTR TS Area	**77,646**	**58.6%**	**63,661**	**92,839**	**70.1%**	**74,921**
Washougal TS Area						
Growth in the City of Vancouver (15% of City & County)	8,307	8,307		8,307	8,307	6,703
Growth in unincorporated	3,088		2,492	3,088		2,492
East County						
Growth in East Cities	16,655		13,441	16,655		13,411
Total Washougal TS Area	**28,050**	**21.2%**	**22,636**	**28,050**	**21.2%**	**22,636**
West Vancouver TS Area	**26,777**	**20.21%**	**21,605**	**11,579**	**8.74%**	**9,344**
Total	**132,468**		**106,902**	**132,468**		**106,902**

2.6 Summary of Findings

The current transfer stations were developed in the early 1990s and since that time the only major change was the construction of the Washougal facility in 2006. New services and programs for managing waste and recyclables have been implemented, but facilities have not been expanded. The population of the County in 2018 is estimated to be 478,000 people, an increase of over 100% since 1990.

Per the OFM, Clark County is expected to continue to grow an average of 1.6% annually for the next 20 years. Based on the 2015 growth management plan, the central and northern parts of the County are likely to experience the majority of this growth. How and where the actual growth will occur in the County can be further analyzed. It is expected that the City of Vancouver, as well as the other cities, will increase in density of development and annex adjacent urban growth areas. However, as the growth management plan projects, significant growth is expected to occur north of 78th Street and between Interstate 5 and Highway 503. The mere fact that no major expansions were made to either CTR and West Van to handle the increased waste volumes warrants further

analysis of how the system can best accommodate this growth and necessitates an evaluation of the investments needed to continue to provide safe, efficient, and cost-effective services in addition to planning for the growth, it should be recognized the solid waste industry is experiencing impacts of changing policies and potentially new regulations being promulgated. Several states are considering bans or other forms of regulation to restrict organics, such as food waste, from being disposed of in landfills. New technologies are developing designed to recover more recyclablematerials and to convert waste into alternative energy resources. These developments need to be considered as the County evaluates the regional solid waste system.

Chapter 3

Operational Efficiencies and Impacts from Traffic and Self-Haul

3.1 Introduction

As part of completing the Regional Study, the County wishes to evaluate the current collection services and transfer station system to assess overall efficiencies and impacts that self-haul traffic has at the transfer stations. The number of self-haul and cash customers using the transfer station system has increased to a point where capital investments are necessary to properly manage both the traffic and the additional waste received. This is a key issue particularly at CTR, where self-haul traffic exceeds 800 vehicles per day on weekend days.

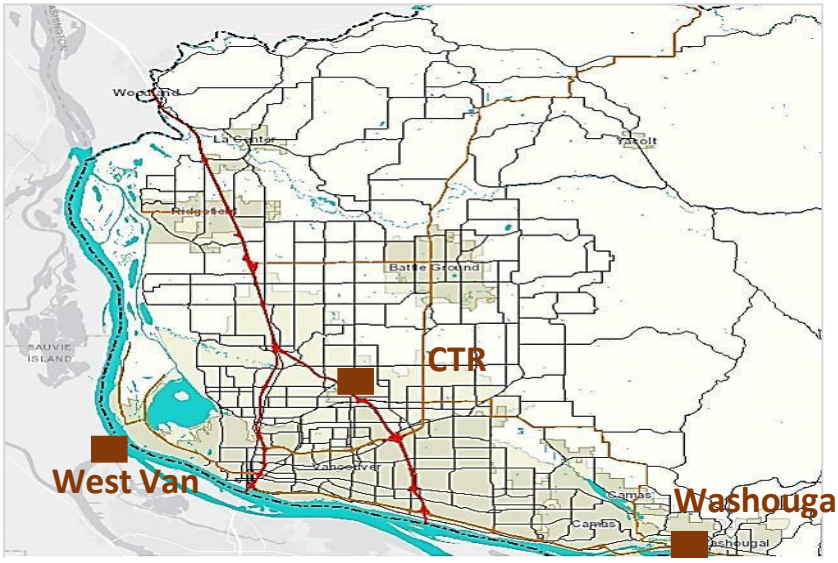
This chapter discusses the current collection services and related policies and practices that pertain to the current level of services. The assessment examines policy options or changes to services that may positively influence the effective use of resources and facilities.

3.2 Current Services and Transfer Station Operations

3.1.1 – Background

Clark County and its incorporated cities currently offer a wide range of garbage and recycling collection services through a contract with WCW, a private waste management company. The City of Camas provides waste collection to its residential and commercial customers. WCW also owns and operates three transfer stations and one MRF in Clark County. These facilities are operated under an agreement between Clark County and CRC, a wholly-owned subsidiary of WCW. A map of the facility locations is shown in Chapter 1.

Figure 3.1: Map of Clark County Recycling and Transfer Stations



All three facilities accept waste from private commercial haulers, route collection trucks, and public (including commercial) self-haulers. Two of the facilities, CTR and West Van, use preload compactors to transfer waste into intermodal containers. The containers are transported by semi-tractor to the Tidewater Barge Terminal west of the Port of Vancouver. Tidewater transports the containers up the Columbia River to the Finley Buttes Landfill near Boardman, Oregon. Waste from the Washougal Transfer Station is transported via semi-tractor-trailer to the Wasco County Landfill near The Dalles, Oregon. Both Finley Buttes and Wasco County landfills are owned and operated by Waste Connections.

3.2.2 – Existing Collection Services

The transfer stations provide a convenient location for residents and businesses, including those that elect not to subscribe to readily available and affordable garbage or recyclable collection services, to dispose of waste and/or recycled materials. Although Waste Connections provides the collection of yard debris and bulky waste items, many households and businesses choose to haul their waste to the transfer stations. Self-haul and cash customers that do not have a preapproved account deliver waste using a variety of vehicles, including cars, pickups, and vehicles with trailers. Bulky items include used furniture, appliances, tires, and mattresses. Table 3.1 on the next page, provides a high-level summary of residential service offerings throughout the County.

Table 3.1: Residential Collection Services Matrix

Jurisdiction	Service Provider	Garbage Mandatory		Recycling Services		Yard Debris / Organics Service		Bulky Item Service	
		Yes	No	Bundled	Subscription	Bundled	Subscription	Bundled	On-Call Fee
Vancouver	WCW	X		X [1]			X		X
Camas	City Garbage, WCW – Recycling and YW	X			X [1,2]		X		X
Washougal	WCW	X		X [1]			X		X
Ridgefield	WCW	X			X		X		X
La Center	WCW		X	X [1]			X		X
Woodland Vicinity (NW Clark County)	Waste Control		X		X		X		X
Urban Growth Boundary (Battleground & Yacolt)	WCW		X		X [2,3]		X		X
Rural	WCW		X		X	Not Available			X

[1] A separate fee is charged for recyclable material processing.
[2] Garbage and recycling are included in the base services, but the rates are not bundled.
[3] Recycling collection is mandated within the Clark County urban growth boundary for customers with weekly waste collection service or greater.

Collection services offered by WCW, under contract with the cities, provide access for residents and businesses to manage waste and recyclable materials effectively. In the cities of Vancouver, Camas, Washougal, and Ridgefield, collection services are universal, meaning all residences and businesses must subscribe to the service. Recyclables services are bundled or included with solid waste collection services in Vancouver, Washougal, and La Center. Throughout the unincorporated county and in the Cities of Battleground and La Center as well as the Town of Yacolt, waste collection services are voluntary, or subscription-based. However, if a resident receives waste collection service weekly or more often, recycling is mandated for customers within the urban growth area.

For the unincorporated portions of the County, the monthly rate for garbage service, regulated by the Washington Utilities and Transportation Commission (UTC), is $13.68 for a 32-gallon can and

$19.93 for 64-gallons (two 32-gallon cans) for weekly pickup. The weekly collection of recyclables adds another $7.85 per month to the cost of the collection service. A full listing of waste, recycling, and yard debris collection rates are detailed on the local WCW website: https://wcnorthwest.com/residential-rates.

In contrast, yard waste collection services are offered on a subscription basis throughout the County, except in rural areas. Table 3.2 below provides a list of yard waste collection services and rates currently offered by WCW.

Table 3.2: Voluntary Subscription Services — Yard Waste Service

Jurisdiction	Service Provider	Yard Waste / Organic Service	
		Monthly Charge	Optional or On-Call Service
Vancouver	Waste Connections (WCW)	$7.80 96 gal	Every other week optional service. Other servicelevels are available. $6.75 per 64-gallon, $5.70 32- gallon, $4.65 20-gallon.
Camas[1]	City — garbage,WCW — recycling andyard debris	$8.24 96 gal	Every other week optional service March – December. No on-call service. $2.92 per extrapickup.
Washougal[2]	WCW	$7.70 96 gal	Every other week optional service March – December. No on-call service. $2.70 per extrapickup.
Ridgefield	WCW	$8.80 96 gal	Every other week optional service. No on-callservice. $3.52 per extra pickup.
La Center	WCW		
Woodland vicinity (NW Clark County)	WCW		
Other Urban	WCW	$6.84	Every other week optional service. Or on-call $1.48 per month cart rental fee and $4.91 for each pickup. $2.86 per extra pickup
Rural	WCW		

[1] Price For 10 Months: $78.42 if prepaid
[2] Price For 10 Months: $73.35 if prepaid

Similarly, an on-call bulky-item collection service is voluntary throughout the County and residents typically must pre-schedule the service on designated days of the month. Table 3.3 on the next page summarizes on-call collection services and fees offered for bulky waste (i.e., appliances and bulky items). Besides the transfer stations and voluntary subscriptionservices for yard waste, residents and businesses can utilize other privately owned facilities throughout the County to discard and divert their materials. Examples of such facilities include butare not limited to:

1. H&H Wood Recyclers
2. McFarlane's Bark
3. Triangle Resources
4. City Bark

These facilities typically charge prices competitive with transfer station pricing.

Table 3.3: On-Call Services — Bulky Item

Jurisdiction	Service Provider	Appliance	Per Unit Charge	Bulky Item	Per Unit Charge
Vancouver[1]	Waste Connections (WCW)	Washer Dryer Stove Fridge/Freezer/AC Unit Water Heater	$18.24 $15.10 $16.67 $30.15 $18.54	Sofa or Loveseat Chair Mattress/Box Spring Car/Pickup Truck Tire Car/Pickup Truck Tire w/ rim Truck Tire Truck Tire with rim Other Bulky Items	$15.10 $12.05 $13.64 $7.18 $11.11 $22.52 $37.15 $15.88
Camas	City — garbage, WCW — recycling and yard waste	N/A		N/A	
Washougal	WCW	Fridge/Freezer/AC Unit Stove or Range Washing Machine Dryer Water Heater	$50.29 $25.16 $25.16 $25.16 $25.16	Sofa or Loveseat Chair Table Mattress or Box Spring Car/Light Pickup Truck Tire Car/Light Pickup Truck Tire w/ rim Truck Tire Truck Tire with rim Tire larger than truck Lawnmower Wheelbarrow Bicycle Other Bulky Items	$25.16 $12.58 $25.16 $18.86 $6.76 $10.16 $20.29 $33.82 $67.67 $13.52 $6.76 $6.76 $25.16
Ridgefield[2]	WCW	Washer Dryer Stove Fridge/Freezer/AC Unit Water Heater Dishwasher	$20.10 $20.10 $20.10 $40.13 $20.10 $20.10	Sofa or Loveseat Chair Mattress or Box Spring Small Tire Small Tire with rim Truck Tire Truck Tire with rim Other Bulky Items	$20.10 $20.10 $20.10 $5.39 $10.78 $12.18 $24.37 $20.10
La Center	WCW				
Woodland vicinity (NW Clark County)	WCW				
Other Urban[2]	WCW	Washer Dryer Stove Fridge/Freezer/AC Unit Water Heater Dishwasher	$5.75 $5.75 $5.75 $20.00 $5.75 $5.75	Sofa or Loveseat Chair Mattress or Box Spring Car/Light Pickup Truck Tire Car/Light Pickup Truck Tire w/ rim Truck Tire Truck Tire with rim Other Bulky Items	$16.12 $16.12 $16.12 $2.35 $4.69 $9.38 $18.77 $16.12
Rural	WCW	N/A			
Electronic Waste: Televisions, computers, monitors, and laptops can be picked up curbside for a price of $15.88 each in Vancouver, $19.52 per unit in Ridgefield, $25.16 per unit in Washougal, $16.12 per in Other Urban, and $16.12 in Rural.					

[1] One free appliance pickup per year. Per-unit charges after that.
[2] In addition to the prices above for a trip fee of $60.00/hour is charged (half-hour minimum). The clock starts from the beginning of the driver's trip (from 9411 N.E. 94th Ave., Vancouver) and ends once the appliance is picked up from the curb.

3.2.3 – Summary of Countywide Collection Practices

The current collection system provides a high level of services to cities, towns, and the unincorporated areas of the County. Universal services for garbage and recyclables are provided to the cities of Vancouver, Camas, Washougal, and Ridgefield. In urban areas, yard waste collection is provided on a voluntary subscription basis either weekly or every other week, and pickup of bulky waste items is offered on an on-call basis.

For the unincorporated areas of the County and the jurisdictions of Battleground, La Center, and Yacolt, collection services are solely offered by WCW on a voluntary subscription basis. The base rates offered for this service are comparable to the base rates offered to customers where universal services are provided. However, some jurisdictions do charge a "Utility Tax" that is added to the base rates to help pay for general governmental services.

Growth in the County has had a significant impact on the density of the urbanized portion of the County. As projected in the regional growth management plan, this trend will continue and many areas contiguous to the incorporated cities are expected to be annexed. These areas may be subject to the universal service levels required by these cities. Population growth will impact the number of customers using the transfer station system. Consideration of providing universal services and/or changes to the service levels and rates may provide a more efficient and comprehensive collection system for waste generated either by residences or businesses.

3.2.4 – Description of Transfer Stations and Customer Traffic

The County transfer station system was developed to first provide cost-effective collection services to residences and businesses. Collection trucks can unload quickly and return to collection routes. CRC can then reload waste into larger trailers capable of transporting almost four times the payload of a collection truck, thereby reducing overall transportation costs and impacts on local roads. Transfer stations also supplement collection services by providing a convenient location for residents and businesses that do not have collection services to take waste or items not collected by regular services to a facility. Even though contracted collection companies offer services to all areas of the County, many residents in less dense areas that do not require universal services often elect to transport their waste to a transfer station.

Transfer stations also provide a facility for residences and businesses to take waste materials that are not regularly picked up at the curb. This can include items from households that periodically clean out attics or garages and may also include used appliances, large bulky items such as used furniture, tires, and mattresses; construction debris; and yard waste. The County system also offers facilities for customers to drop off recycling materials and to dispose of household hazardous waste (HHW).

As discussed in Chapter 2, due to population growth in the County, the number of customers using transfer stations continues to increase. Changes in the system and improvements at facilities need to be evaluated.

3.3 Future Traffic Impacts from Growth

The transfer stations were designed to handle a certain amount of self-haul customers given that portions of the County do not require all households to subscribe to regular collection services and that certain items are not collected regularly. However, with the growth the County has experienced over the past 10 years, the number of self-haul and cash customers has increased. CRC provides the resources and space required to manage traffic and additional waste received from these customers at each of its transfer stations. But with the County expecting to grow by an additional 132,000 more people by 2035, capital investments at each of the transfer stations will be necessary to handle the number of customers using the existing three transfer stations.

An evaluation of the transfer stations and the capacity to handle future waste volumes and customers is discussed in Chapter Four of this Study. In this chapter, the Study discusses options that might be considered to modify or expand collection services, to make it more convenient for households to dispose of unwanted items, enhance efficiency, reduce unintended litter along roads, and reduce system cost. Since self-haul traffic at CTR is most impactful, with vehicles queueing onto State Route 503 at times, this facility is the focus of the analysis. However, the options being discussed in this section are intended to be applicable on a County-wide basis.

3.3.1 – Background Information; Population and Self-Haul Customer Trends

As mentioned, the population in Clark County is expected to increase by about 28% over the next 15 years. Much of this growth is expected to occur within the areas served by CTR. Estimated population growth within the northern incorporated cities and the unincorporated areas of the County has increased by 20.8% from 2010 to 2019, as detailed in Table 3.4.

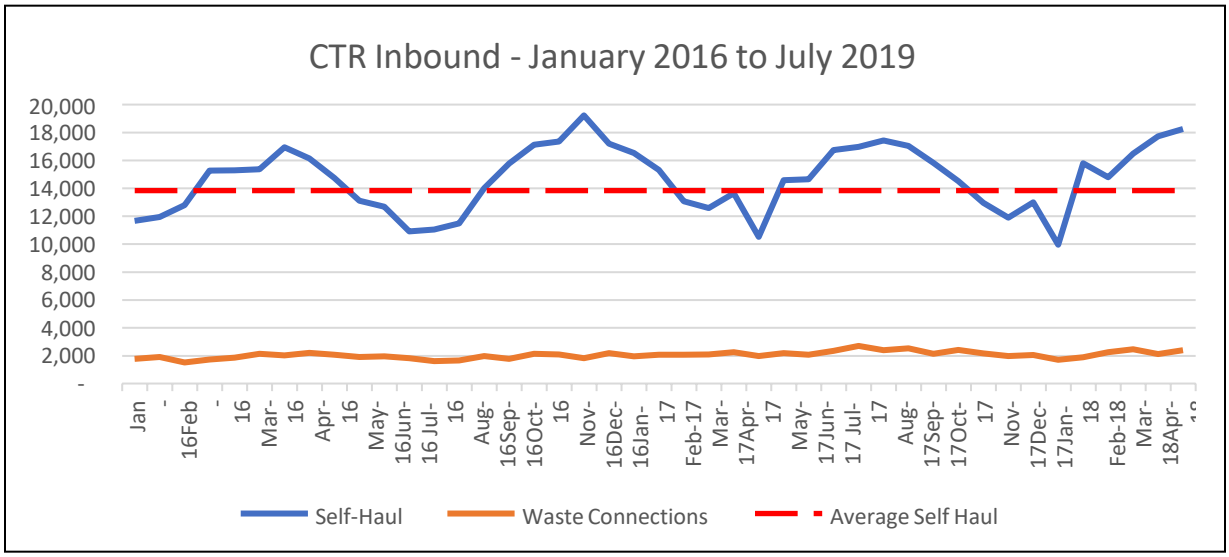
Table 3.4: Population Growth from 2010–2035 for North County

	Year					
Jurisdiction/Area	**2010**	**2015**	**2019**	**2025**	**2030**	**2035**
Battle Ground	17,571	19,250	21,520	28,219	33,860	38,443
La Center	2,800	3,100	3,405	5,082	6,494	7,642
Ridgefield	4,763	6,400	8,895	15,465	20,998	25,494
Yacolt	1,566	1,620	1,805	1,868	1,921	1,964
Clark UGA	61,855	69,610	71,333	72,903	67,088	61,403
Total	**88,555**	**99,980**	**106,958**	**123,537**	**130,362**	**134,946**
% ▲ from 2010		12.9%	20.8%	39.5%	47.2%	52.4%
Total Increase from 2010		**11,425**	**18,403**	**34,982**	**41,807**	**46,391**

1 Source: Washington State Office of Financial Management, Forecasting, and Research Division (https://www.ofm.wa.gov/washington-data-research/population-demographics/population-estimates/april-1-official- population-estimates)

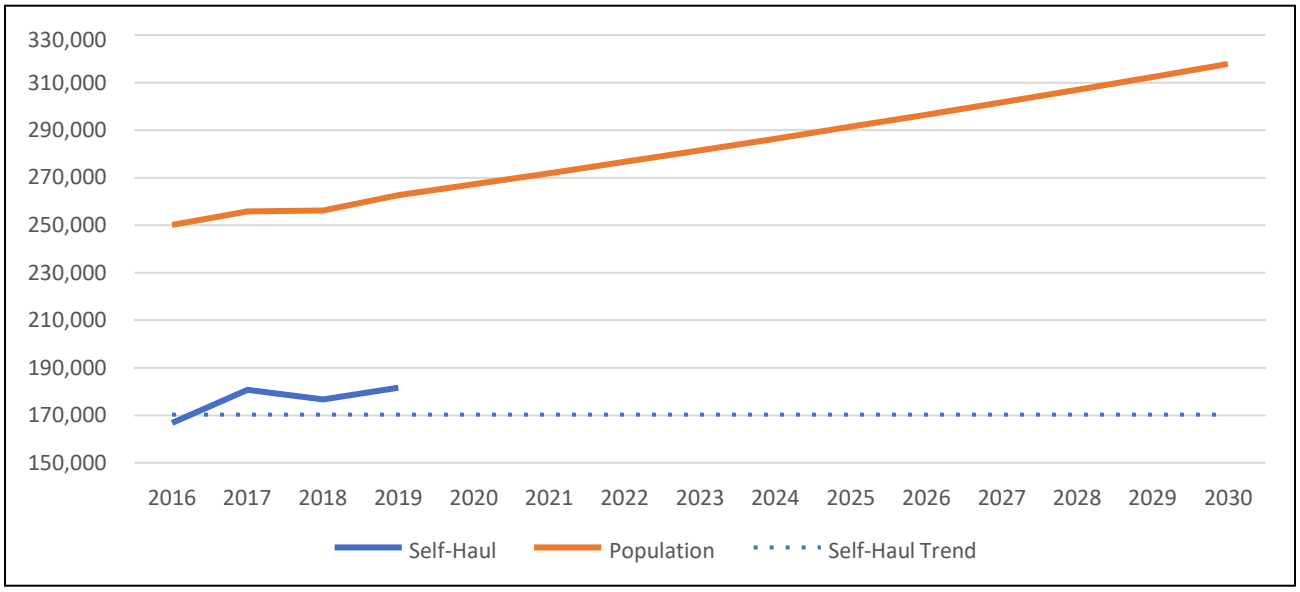
With the growth the County has experienced in the past decade, an increasing number of customers are using the CTR transfer station for waste and bulky items. Graph 3.1 on the next page details the monthly transactions, or trips, by all customers (i.e., self-haul, commercial, and collection trucks) at CTR. The red dashed line shows the trend of incoming self-haul/commercial customers from January 2016–July 2019, which reveals an upward trajectory that correlates closely to the increased population growth.

Graph 3.1: Monthly Inbound Trips at CTR from January 2016–July 2019



Graph 3.2 compares the expected increase in the north county population of 1.75% annually from Table 3.4 on the previous page to the annual inbound self-haul trips from Graph 3.1 above.

Graph 3.2: Comparison of Annual Self-Haul Trips to Population Growth



The blue dashed line is the expected increase in self-haul customers based on the four years of incoming customers and the correlation of the increase in the population of the north county area.

While some jurisdictions such as Vancouver, Camas, Ridgefield, and Washougal require residential waste collection, services in the north part of the County are voluntary subscriptions. Because of this, CTR experiences a higher percentage of inbound tons from self-haul when compared with the West Van and Washougal transfer stations, as summarized in Table 3.5.

Table 3.5: Self-Haul Metrics by Facility

Facility	2016	2017	2018	2019
CTR				
Self-Haul % of Tons	21.0%	22.6%	20.6%	22.3%
Average Pounds Per Customer	635	794	704	725
West Van				
Self-Haul % of Tons	14.5%	17.5%	18.1%	16.4%
Average Pounds Per Customer	804	922	817	783
Washougal				
Self-Haul % of Tons	10.6%	12.8%	14.0%	16.4%
Average Pounds Per Customer	446	486	451	476

The original R&R Transfer Station (now the CTR recycling building) was opened in the mid-1980s, but when the Leichner Landfill closed in 1992, the facility was expanded to what is now CTR. However, the facility was not designed to serve the increase in customer traffic or the amount of waste that it now receives.

3.4 Strategies to Reduce Traffic Impacts at Facilities

This section of the report examines how changes in policies and/or collection services could potentially reduce traffic at the transfer stations, primarily at CTR. However, the program options described are expected to apply to all transfer stations.

3.4.1 – Background

The location and design of the existing transfer station system have not been fully assessed for over 15 years. Since 2010, Clark County has experienced an increase in the population of 14%[2]. The last major investment in the system was the construction of the Washougal Transfer Station in 2008–2009. At CTR, where the number of customers has increased significantly, there have been no expansion or improvements made to meet the demand. As a result, traffic on

2 Source: Washington State Office of Financial Management, Forecasting, and Research Division (https://www.ofm.wa.gov/washington-data-research/population-demographics/population-estimates/april-1-official- population-estimates)

typically backs onto State Route 503. This condition presents safety issues. Thus, there is an immediate need to remedy this situation. CRC is working with the County and the Washington Department of Transportation (WSDOT) to modify the entrance and make other improvements, as necessary, to address this which are discussed in Chapter 4 of this Study.

While each transfer station has experienced increases in traffic and waste flow, the issue is most critical at CTR. The West Van and Washougal Transfer Stations are adequately sized to handle self-haul customer traffic for the immediate future. A review of the capacity of these facilities to handle future growth will also be conducted as part of this regional study and improvements to address future traffic and waste volumes may be required is presented in Chapter 4.

To address current and future traffic issues at CTR as well as the other stations in the future, the Study evaluates operational and policy strategies and options that may reduce unnecessary traffic and queuing problems. These strategies are focused on changes to rates, policies, and collection service standards. A crucial policy issue is how much money will need to be invested to upgrade and/or expand CTR.

One approach is to evaluate current operational parameters to determine what policy or administrative procedures might be implemented to improve safety, traffic, and overall customer services. This includes examining how other jurisdictions or facility operators have dealt with similar issues in consideration of the following strategies:

1. **Modify level of collection services —** Modifications to collection services standards including mandatory or universal service and/or bundling more services (e.g., curbside yard waste and bulky item collection as part of a universal service package).
2. **Modify facility fee structures —** Minimum load requirements and fees to encourage customers to use collection services to make fewer trips to thetransfer stations.
3. **Modify the hours or days transfer stations are open to self-haulers –** Extending hours and/or days the facilities are open to self-haul may result in reducing traffic at peak times.

The analysis examined the impacts of the current minimum load requirements in conjunction with minimum fees for services. From the research completed, options the County can consider for customers to consolidate waste into larger loads or to utilize weekly waste collection services to reduce traffic and costs were evaluated.

Given the current breadth of curbside collection services offered to customers countywide (see Table 3.1 on page 3-3, there remains a relatively large number of self-haul customers using CTR as their primary waste disposal option (see Graph 3.2 on page 3-8 and Table 3.5 on page 3-9); such high usage is causing backups and related traffic issues at CTR.

3.4.2 – Strategy 1: Modify Level of Collection Services

One approach that may result in reducing the number of self-haul and cash customers is to modify the current services by requiring all households to subscribe to weekly collection and/or provide options to pick up bulky items at the curb, i.e., universal services. This would not only impact traffic

at the transfer stations but would also reduce traffic and litter on roadways, improve services to individual households, and improve overall efficiency in the waste management system.

A 2018 survey of CTR self-haulers found that the two ZIP codes with the highest self-haul customer counts were predominantly in the unincorporated areas of the County where weekly collection is provided but not mandated, under the regulation of the UTC. Table 3.6 below shows the distribution of self-haul or cash customers using CTR by the amount of trash received by weight (from CTR scale house data) for 2019.

Table 3.6: Summary of CTR Cash Customers by Weight (2018)

Weight Range (lbs.)	Self-Haul / Cash Customers Total #	Self-Haul / Cash Customers Total %
10–110	12,927	10.9%
110–210	22,933	19.3%
210–310	20,775	17.5%
310–410	16,540	13.9%
Subtotal under 410 lbs.	***73,175***	***61.7%***
Over 410 lbs.	**45,477**	**38.3%**
Total	**118,652**	**100%**

According to the self-haul tonnage data from Table 3.6 above, approximately 30% of the incoming loads from self-haul and cash customers were 210 lbs. or less. The average residential weekly garbage set-out weight is about 30 lbs. and for recycling 55 lbs. per month; Therefore, a month of garbage set out for collection will weigh approximately 185 lbs. (30 lbs. x 4.3 pickups per month) + 55 lbs. of recycling. It is assumed most of these visits are customers that do not subscribe to weekly garbage, recycling, and yard waste (if offered) or bulky waste collection service. Areas that had the lowest number of self-haulers were from Washougal, Camas, Ridgefield, and Vancouver, where service is universal.

Under the current rate structure, the cost to dispose of 200 pounds at CTR is $9.58 for disposal plus $10 for the transaction fee (see Table 3.8 on page 3-17) for a total cost of $19.58. In contrast, the cost for curbside waste collection in the County is $19.93 for two garbage cans (64 gallons of service capacity) collected weekly and only $13.68 for a 32-gallon can. The system's cost to provide services at the transfer station for self-haulers should be evaluated to determine if these customers are being charged properly for the services. Depending on the actual cost per trip, the minimum charge could be revised.

3.4.2.1 – Service Option to Expand Universal Subscription Collection Services

Under this option, the County would expand universal services to the urban areas of the County. One approach for implementing this alternative is for the County to establish a Solid Waste Collection District, under the Revised Code of Washington (RCW) 36.58A.010. Administrative rules enacted by the District could specify that areas meeting minimum household densities be required to subscribe to collection services. The level of services must be uniform to all service areas and must comply with requirements established by the UTC. Other approaches to set up

universal services could include revising local codes or establishing a service level ordinance.

All cities in the County, except the jurisdictions of Battleground, La Center, and Yacolt, have universal collection services for garbage. These jurisdictions have the authority to adopt universal services if they wish. As areas of the County become denser and more urban, requiring universal service to the urbanized County as well as these cities benefit the system and potentially reduce traffic at transfer stations.

Analysis of Expanding Universal Service

Jurisdictions that provide universal services to all households can have an impact on the number of customers that self-haul waste. Requiring households to subscribe to collection services is standard practice for many jurisdictions throughout the country. For most urban areas, it is required as a general practice, for health and safety reasons, to prevent households from inappropriately storing putrescible waste that may cause sanitation problems, attract vectors, and/or impact the aesthetics of the neighborhood.

Another advantage of universal services is to reduce unnecessary traffic on public roads and thus reduce air-quality impacts. Collection trucks are already traveling in neighborhoods to pick up from households that do subscribe to services. Picking up additional households along the routewill reduce trips to the transfer station and provide routing efficiencies for the waste hauler. When garbage or yard waste is collected, it is placed in fully enclosed containers and emptied into a fully enclosed compaction chamber in the truck, thus eliminating fugitive litter. The above factorsall result in benefits to the local community.

A comparison of the self-haul traffic at CTR and West Van appears to lend some support to the impacts of instituting universal collection services. The self-haul traffic at CTR averages about 450-500 vehicles per day and in peak periods can range as high as 700-800 vehicles. At the West Van transfer station, self-haul traffic averages from 200-250 vehicles per day and in peak periods range from 350-400 vehicles per day. This is about half as many as CTR. West Van primarily serves the City of Vancouver, the largest city in the County, which provides universal collection services. CTR not only serves a larger area but is also the largest concentration of customers that use a voluntary subscription service. No data substantiate the difference in self-haul customers at West Van that can be fully attributed to the impact of universal service, but it likely contributes to fewer customers using that facility.

Data also shows that over 80% of households in urbanized areas of the unincorporated County subscribe to recycling services. If this is an indication of the total households that also subscribe to the collection of waste, which is logical, then perhaps the adoption of universal services would havelimited impacts on the number of vehicles using CTR.

Related to the cost of weekly solid waste collection services in Clark County, a single household in the non-universal service areas (i.e., UTC regulated area) can subscribe to a weekly collection of garbage for as low as $10.68 per month (20-gallon service) to as high as $29.54 per month (96-gallon service). A typical customer is likely to subscribe to a 32-gallon service, which is $13.68 per month.

In comparison, a single trip to the transfer station is likely to cost a minimum of $19.58 (assumes 200-lb. load) and as much as $34 for a 500-lb. load. This cost does not include roundtrip travel time to the station or time at the station to unload. It appears it would cost households much less to use the curbside collection service based on the current transfer station rates.

Although there are obvious cost benefits for households to subscribe to collection service, it is not clear how much impact universal service, if offered, would have on the self-haul traffic at transfer stations. More study is needed to determine the benefits of adopting this policy. Also, the reasons to institute universal services go beyond the need to reduce self-haul traffic as it provides greater benefits to the individual community or local jurisdiction that may adopt this policy and it improves the overall efficiency of the solid waste system.

3.3.1.1 – Service Option to Bundle Regular Collection of Bulky Items with Garbage Collection Services

Unlike curbside garbage and yard waste collection services, on-call services for appliances are more expensive than the rates charged at the transfer stations. As shown in Table 3.3 on page 3-5, curbside pickup of bulky waste varies depending on the item being discarded. In the urbanized County, a sofa or chair picked at the curb is $16.12 plus a trip fee of $60 per hour. This fee is charged from the time the truck leaves the yard on 94th Avenue to the pickup address. If it takes 20 minutes to arrive at the location, the total cost would be $36.12 for one item. For a self-haul trip to a transfer station, that same item may cost less than $20 if it weighs less than 100 pounds. Also, each of the Clark County facilities charges special handling fees as shown in Table 3.7 for appliances, electronic waste, and tires.

Table 3.7: Clark County Transfer Station Special Charges

Item/ Material	Per Unit Charge
Refrigerator, Freezer or Air Conditioner	$20.25
TVs, Monitors	$0.00[1]
Car Tire	$2.55[2]
Car Tire w/rim	$4.85[2]
Truck Tire	$9.45[2]
Truck Tire w/rim	$18.65[2]

[1] TVs and monitors not shown on rate sheet at West Van.

[2] A transaction fee will not be charged on the first four tires brought in separately. A $5.25 minimum applies. As requiredby Washington State, a 3.6% GRT tax will be charged on every disposal transaction at each facility.

At the transfer station, tires and appliances are charged a fee, but bulky items such as used furniture, mattresses, and other items are charged on a per-ton basis. Also, self-hauling bulky materials to the transfer station might be more convenient since households can dispose of the item on their schedule.

There are other possible service options for collecting appliances, bulky items, and electronic waste items including:

- **Special Collection Events –** One approach is to offer periodic community-wide collection events in the spring or fall. Such events would likely increase the total amount of items collected compared with subscription services. The City of Camas holds an annual spring

clean-up where residents bring large materials and household hazardous waste to the public works yard for disposal. In the City of Vancouver, neighborhoods are provided on one Saturday per year to have WCW trucks and staff in their area to collect bulky items or other materials for disposal/diversion.

In Oregon, the cities of Troutdale and Milwaukie have annual spring clean-up events where residents can set out up to one yard of waste on their curb for pick-up by the franchised haulers. The cost of these services is less than $1 per customer per month and is included in the monthly collection rate.

Resourceful Portland sponsors a series of local springtime clean-up events with a variety of community groups that provide convenient drop-off services for a reasonable donation or fee. Each group can offer a combination of bulky waste collection, an onsite reuse section, and litter pickup.

Clark County's Green Neighbor Program has offered "Recycle Days" in the past where a variety of recyclable or HHW materials or services (paper shredding) and sometimes disposal of bulky items (with local funding support) was incorporated into centralized community events. As a policy shift over the past two to four years, these events have been discontinued as it is challenging to plan, staff, and fund these one-day events (there had been up to seven or eight per year). There is much greater interest in making these opportunities available throughout the year in fixed locations.

Bulky Waste Collection as Part of Franchise/contracted Service (a.k.a. Bundled Services)

Some jurisdictions provide on-call curbside collection services for bulky waste one to three times per year. These services are included in the standard garbage rates charged to residential customers. Such service is commonplace throughout California and has proven popular with customers and more cost-effective than periodic collection events. In the South Bayside Waste Management Authority (San Mateo County, California), 34% of all residential accounts scheduled bulky item pickup services as part of their twice-per-year on-call bulky item service. The service is bundled with weekly garbage collection rates. Items can include furniture (sofas, chairs, desks, bookshelves, etc.), mattresses, electronics scrap, appliances, and tires. Often the amount of items set out by the household is limited to a certain number or size. However, each jurisdiction may choosewhat items are acceptable to be placed on the curb for collection.

Another example in California is San Benito County, where such bulky item service was on an on-call basis with separate charges and less than 1% of the residential accounts scheduled bulkyitem pickups.

There are many variations of the options to provide the collection of bulky waste items, and jurisdictions can design the services to best fit their community. Based on some of the examples, these services can be added, for a rather small incremental cost, to standard curbside services. If implemented in Clark County there is no current data available to determine if such a program would impact the number of self-haul customers using the transfer station system. More data is needed, and it would also be desirable to have feedback from residences of their interest in such services.

Currently, it is not permissible to blend the bulky waste collection with standard MSW collection services in WUTC franchised areas. However, cities that negotiate collection service contracts can adopt programs for their jurisdictions. Also, the County could include bulky collection as part of the transfer station operations contract.

Yard Waste/Debris Collection

Similar to curbside garbage collection, it would be less expensive for residents with smaller loads (i.e., less than 500 lbs.) of yard waste/debris to use the curbside services as opposed to driving to one of the County's transfer stations. Subscription services for curbside collection of yard waste range from $6.84/month (Other Urban) to $8.80/month. If a customer takes 500 lbs. to CTR or Washougal Transfer Station, it will cost $16.58 ((500/2,000) x $66.32). Yard waste collection service is only offered on a subscription basis throughout the urban areas of the County. Including yard waste collection service as part of a universal collection service package will appear to save residents money if they generate measurable volumes of organic waste while having the added benefit of reduced self-haul traffic and increasing diversion rates for local communities.

Currently, in cities and the County curbside collection of yard waste is offered by subscription. Also, there are several private companies throughout the County that accept and process yard waste meaning there are alternatives to taking this material to transfer stations. For this reason and because most residences do not generate much yard waste during the winter months, the benefits of adding this to the universal services appear unnecessary at this time.

Analysis of Service Options for Collection of Bulky Items

The purpose of expanding collection services to offer standard universal collection services for bulky waste items and/or yard waste would be to provide a higher level of collection services potentially and reduce self-haul customer traffic at transfer stations. There would be an incremental increase in the monthly rate to all residences to provide this service. However, without more information, it is not known how many households would take advantage of this service or may not even require it.

To implement any of the collection service options the County would need to comply with certain requirements established by UTC. The first requirement is to ensure that the services areoffered universally, that are available equally to all customers throughout the regulated areas. For items covered under the bulky waste services, the rates would need to be equally applied for all sizes and weights. If the rates are different then there is a level of unpredictability in setting rates that is not acceptable to UTC. Assuming the program can be designed to address UTC concerns, the County would need to amend the Solid Waste Management Plan and adopt this program.

This would establish the program to permit the collection company to include in their cost of services and apply to the UTC for a fixed rate. Because it is difficult for collection companies to predict the cost and revenues in conjunction with requirements for such services from the UTC, there are few if any jurisdictions in the State that offer this service. Jurisdictions, like the City of Vancouver, that regulate collection rates have the authority to implement these programs if they desire. These same conditions apply to bundling yard waste collection services. Currently, it is offered as a subscription service but is not a universal service in any part of Clark County.

Based on the limited data available to properly evaluate these service options including the impacts on self-haul traffic at transfer stations, it is not a high priority to pursue these options. However, in light of the expected population growth and the increase in density of development in the County, consideration for further evaluation of collection programs for bulky waste items might have some benefits when updating the Solid Waste Management Plan in 2021.

3.3.1 – Strategy 2 - Modify Facility Tipping Fee Structures

3.3.1.1 – Background

Currently, self-haul customers using transfer stations are charged a fee based on the weight of the discarded items plus a flat transaction fee of $10. The current tip fee is $95.77 per ton. All vehicles are required to weigh in and out to determine their fee. If a self-haul cash customer brings in 100 lbs., their fee would be $14.79 — $4.79 for the prorated tip fee plus $10 for the transaction fee. For a load of 200 lbs., the fee would be $19.58 — $9.58 for the prorated tip fee plus the $10 transaction fee. As shown in Table 3.6 on page 40, about 30% of customers entering CTR dispose of 200 lbs. or less. Another 30% of CTR cash customers discard between 200 lbs. and 400 lbs. of waste.

The County is interested in determining the actual system or facility cost to provide the level of services currently provided at the transfer stations and whether alternatives to the fee structure could result in reducing traffic or incentivizing customers to consider other service options.

Comparable Fees at Transfer Stations

All of the transfer station facilities shown in Table 3.8 on the next page, except Clark County, have a set minimum rate for garbage by dollar amount instead of adding a transaction fee. This is because there is a fixed cost to provide the services that must be recovered. In contrast, Clark County solid waste facilities have a transaction fee of $10 that contributes to recover the fixed cost. Nearly all facilities shown also have a minimum rate/charge for yard waste and some have a minimum for wood waste.

The policies for establishing the minimum fees may differ for each facility. However, in our research, many have set this fee to require customers to pay for the actual cost of the services provided.

Table 3.8: Local and Regional Transfer Station Rates

Jurisdiction	Garbage			Yard/ Wood Waste			
	Minimum Rate	Garbage Minimum Weight	Garbage Rate / Ton	Yard Waste Minimum Charge	Yard Waste Rate / Ton	Wood Waste Rate Minimum Charge	Wood Waste Rate / Ton
Clark County – CTR, WTS	**$10 Transaction Fee + Weight x $95.77 Example: Weight @ 200 lbs. = $10 + $9.58 = $19.58**	**None**	**$95.77**		**$66.74[1]**		**$66.74[1]**
Clark County – West Van	**See above**	**None**	**$95.77**		**$66.32[1]**		**$66.32[1]**
Portland Metro_ Central and South	$28 plus Transaction Fee of $2 Using scales or $10 w/o Scales	360 lbs.	$122.45	$24	$81	$26	$90.23
King County – all Transfer Stations	$25.25	320 lbs.	$151.06	$12	$75	$12	$75
City Seattle – North and SouthTransfer Stations	$30	420 lbs.	$145	$20	$110	$20	$110
Lewis County	$10	200 lbs.	$90	$5	$60	$5	$60
City of Tacoma Recovery and Transfer Station	$20	400 lbs.		$20			
Deschutes County – Knot Landfill Recycling and TS	$22 + $3 for each 100 lbs.	400 lbs.					
Marion County – North Marion Recycling TS + SKRTS	$25 + $.053725/lb. after 460 lbs.	460 lbs.	$107.45	$15.00 ($.0297/lb. after 500lbs.	$59.49		
Thurston County - WARC	$18	300 lbs.	$119	$9	$45		

[1] *Transaction fee does not apply.*

3.4.2.2 – Option to Modify Fee Structure to Impact Traffic

The actual cost to operate the facility is comprised of two elements. The first is the fixed cost to provide the infrastructure as well as the primary personnel to operate equipment along with laborers/spotters and the gatehouse staff. This baseline cost is incurred by each vehicle that arrives to unload waste no matter how much waste is discarded. Second, are the primary variable expenses, which includes the cost of transporting and disposing of waste.

Based on the cost-of-service analysis the fixed cost or cost for handling each vehicle or transaction is estimated to be $21.603 at CTR for the 12 months beginning in April 2018 to March 2019. Itdoes not include the cost to provide recycling and household hazardous waste (HHW) drop-off services at the transfer stations. The facility cost or fixed cost for each transaction, no matter howmuch waste is received, was calculated by dividing the operating expenses of CTR by the total incoming vehicles as summarized in Table 3.9.

Table 3.9: CTR Cost Per Transaction (April 2018–March 2019)

Description	Detail	%	Totals
Annual Facility Cost			$4,386,389
Incoming Self-Haul / Commercial Vehicles	176,614	87%	
Incoming Regulated Route Vehicles	26,460	13%	
Total Incoming Vehicles (Transactions)			203,074
Cost per Transaction			**$21.60**

Facility expenses between the regulated route trucks and cash/commercial haulers were allocated based on a combination of onsite labor, equipment use, waste tons, and scale house transactions to calculate the cost of each customer class. Transport, disposal, HHW, and County administration fees are assessed on a prorated weight per ton basis and are the same for all customers. Table 3.10 summarizes the incoming waste tons by source and the cost per ton for CTR.

Table 3.10: CTR Cost Per Ton by Source (April 2018–March 2019)

Description - Tonnage	Total	Regulated Route Trucks	Self-Haul / Commercial
Incoming Tonnage	230,595	156,631	73,965
Incoming Vehicles	203,074	26,460	176,614
Average Tons per Vehicle Type	1.14	5.92	0.42
Description – Cost/Ton			
Facility Cost	$22.16	$12.85	$41.87
Transport & Disposal	$45.45	$45.45	$45.45
HHW / County Admin Fee	$9.12	$9.12	$9.12
Total Cost per Ton	$76.72	$67.41	$96.43

The fixed cost for the services provided at CTR is $21.60 for any vehicle; however, the current transaction fee assessed for all vehicles is $10. The total cost for not only operating the station but also transporting and disposing of the waste is $95.77 per ton. What is not clear under the current rate structure is what expenses the transaction fee is covering and what expense is the tonnage fee covering. Both of these costs are combined when assessing the tip fee for disposal.

Costs from Tables 3.9 and 3.10 are combined to compare the current rate method to a transaction-based fee of 100 pounds in Table 3.11.

Table 3.11: Comparison of Current Fee to Transaction Fee Structure

Rate Structure Items	**Current Rate Structure**	**Transaction Fee Structure**
Transaction Fee	$10.00	
Disposal Fee per Ton (100 pounds/ 2,000) x $95.77)	$4.79	
Total Fee	**$14.79**	
Transaction Fee (Based on fixed Cost) from Table 3.9		$21.60
Disposal / HHW / County Fee per Ton from Table 3.10 (100 pounds/2,000) x ($45.45 + $9.12)		$2.73
Total Fee		**$24.33**

The current $10 transaction fee offsets some of the facility costs for lightweight customers but is approximately 40% below the cost of providing the service. Not only does this rate fall short of paying for the service it is less than the current month subscription for curbside pickup service. Under the current rate structure, a 300-pound load is very close to the transaction fee structure in Table 3.11.

Disposal Fee ((300 pounds / 2,000) x $95.77))	**$14.37**
Transaction Fee @ $10	**$10.00**
Total Fee:	**$24.37**

Although this total fee is about equivalent to what the actual cost of the service is CTR it does not recover the variable cost to transport and dispose of the waste received.

The current transaction plus the cost of the waste delivered if less than 300 pounds is less than the monthly charge to subscribe for weekly curbside service. It would therefore appear to create some incentive for households to transport their own waste.

Minimum Tip Fee Option – Minimum Weight/Tip Fee Structure (Transaction Fee + Weight)

The cost-of-service study for the transfer station concluded the combined cost per ton for all three transfer stations (facility cost) was $23.48, but the per-ton cost between regulated waste collection and self-haul/commercial customers was $14.06 and $36.62 per ton, respectively. The difference between the two customer classes is the effort necessary to provide the services. The time, floor

space, and manpower necessary to drive across the scale, dump on the tipping floor, and leave for a route truck is lower compared with self-haulers.

A financial incentive for customers to reduce the frequency of vehicles with small weight loads is to set a minimum rate. Portland Metro has a minimum fee of $28 for loads under 360 pounds. Any load greater than 360 pounds is assessed a per-ton fee of $97.45 plus a $10 transaction fee.

If a minimum gate rate were set at 410 lbs., the amount that would be charged at the current tipping fee is $29.63 ($95.77 tipping fee x (410 / 2,000) + $ 10 transaction fee). The fee would be applied to approximately 62% of cash/commercial customers.

Minimum Tip Fee for County Transfer Stations

Establishing minimum fees could result in reducing the number of customers that deliver small volumes of waste thus decreasecould traffic at CTR. In the calendar year 2018, CTR reported 176,253 self-haul and commercial customer transactions. Most of these customers (85.5%) were weighed. As detailed in Table 3.12 below, over half of the incoming vehicles weigh under 300 pounds; the table summarizes the range of weights from various types of vehicles.

Table 3.12: CTR Incoming Waste Volume by Vehicle

	Car	Truck	Van	Total	% of Transactions
0 to 100	754	11,067	870	12,691	13%
101 to 200	505	19,990	1,368	21,863	22%
201 to 300	199	17,342	1,186	18,727	19%
301 to 400	90	13,056	926	14,072	14%
401 to 500	60	8,545	715	9,320	9%
500 +	66	19,794	2,324	22,184	22%
Totals	1,674	89,794	7,389	98,857	
0 to 300	**1,458**	**48,399**	**3,424**	**53,281**	**54%**

Another consideration is that the cost of service varies between collection route trucks and self-haulers/commercial companies. The primary reasons for the cost difference are the additional staff, floor area, and the increased time to dump. The current disposal fee per ton is $95.77. In addition to the cost per ton, a $10 transaction fee is assessed on all incoming loads. Therefore, the effective cost per ton varies with the amount of waste disposed of. Table 3.13 on the next page compares the total disposal fee and the effective disposal fee for various waste payloads.

Table 3.13: Effective Disposal Fee for Variable Incoming Tonnage Volumes

	Weight				
	100 pounds	200 pounds	300 pounds	1 Ton	8 Tons
Disposal Fee[1]	$4.79	$9.58	$14.37	$95.77	$766.16
Transaction Fee	$10.00	$10.00	$10.00	$10.00	$10.00
Total Disposal Fee	**$14.79**	**$19.58**	**$24.37**	**$105.77**	**$776.16**
Effective Cost per Ton[2]	$295.77	$195.77	$162.44	$105.77	$97.02

[1] Calculation (weight / 2,000) x $95.77 disposal fee per ton

3 Calculation (Total Disposal Fee / (Weight / 2,000)

It could be argued the transaction fee provides a financial incentive to consolidate waste and reduce trips to the transfer station; however, the amount of incoming loads under 300 pounds proves otherwise. One suggestion would be to set a minimum fee of $25 for a minimum load of 300 lbs.

Analysis of Options to Modify Facility Fee Structure

Adopting a minimum charge of $25 per ton with the current $10 transaction fee is the equivalent to disposing of 313 pounds of waste. Metro currently has a minimum fee of $28 for 360 pounds of waste. Metro also has a $10 transaction fee that is assessed on loads greater than 360 pounds.

If a minimum charge of $25 for cars and pickups were adopted, scale operators could accept $25, or a ticket would be printed based on total weight. The vehicle would proceed to unload at the station. Upon exiting across the scale, the customer would insert the ticket and obtain a weight total. The customer would either pay the attendant or use a credit card terminal to complete the transaction if the weight were more than the minimum of 300 pounds. The vehicle would exit upon payment. A similar system is operating at the Seattle North transfer station that has resulted in reducing the transaction times at the scale house and thus has prevented traffic congestion.

The current rate for residential waste and recycling service outside the Urban Growth Area is $22.12 per month for a 32-gallon can be collected weekly. Setting the minimum fee for self-haul service at a few dollars above the current rate provides residents an additional incentive to subscribe to regular collection service. The County and WCW could initiate a promotion program to inform customers about the increased disposal fee at the transfer stations and the advantages of subscribing to regular waste and recycling collection services.

The financial impact of a $25 minimum rate is expected to generate between $300,000 to $350,000 annually of additional revenue at CTR and reduce the subsidy by one customer category for the self-haul/cash customers with small loads.

3.4.3 – Strategies to Modifying Hours & Days of Operation

3.4.3.1 – Background

One strategy to reduce peak traffic events at transfer stations is to expand the time the facility is open to customer traffic. Each transfer station is open to receive customers based on the needs of the service area. For both CTR and West Van, the stations are open every day whereas Washougal is only open a few days per week. Below is a summary of the current operating hours:

West Van Material Recovery Facility and Transfer Station

6601 N.W. Old Lower River Road, Port of Vancouver
Monday–Friday 6 a.m.–6 p.m.
Saturday 8 a.m.–4 p.m.

- Recyclables are accepted for free during business hours.
- Household hazardous waste is accepted for free from county residents on Fri. and Sat. 8 a.m.–4 p.m. There is a 25-gallon or 200-lb. limit.
- Closed: Sundays, Thanksgiving, Christmas, and New Year's Day. May close early on Christmas Eve and New Year's Eve

Central Transfer and Recycling Center

11034 N.E. 117th Avenue, Vancouver
Monday–Friday 6 a.m.–6 p.m.
Saturday–Sunday 8 a.m.–4 p.m.

- Recyclables are accepted for free during business hours.
- Household hazardous waste is accepted for free from county residents on Fri.–Sun. 8 a.m.–4 p.m. There is a 25-gallon or 200-lb. limit.
- Closed: Memorial Day, Fourth of July, Labor Day, Thanksgiving, Christmas, and New Year's Day. May close early on Christmas Eve and New Year's Eve.

Washougal Transfer Station

4020 S. Grant Street, Washougal
Household garbage is accepted ONLY on Wednesdays from 7 a.m.–5 p.m., Fridays from 7 a.m.–5 p.m., and Saturdays from 8 a.m.–4 p.m.

- Recyclables are accepted for free every day during business hours (Monday–Friday from 7 a.m.–5 p.m., Saturday from 8 a.m.–4 p.m.) except Sunday.
- Household hazardous waste is accepted for free from county residents on the third Saturday of the month from 8 a.m.–4 p.m. There is a 25-gallon or 200-lb. limit.
- Closed Sundays. Transfer Station may close on holidays and may close early on Christmas Eve and New Year's Eve.

Similar to most jurisdictions that operate transfer stations, the County system provides a fairly high level of service for self-haul and cash customers. To keep up with the increased traffic, capital investments will be needed to expand the infrastructure to continue to provide safe and efficient services. Options to restrict or increase the hours and/or days that are open to the public may result in reducing the overall number of self-haul customers. If this approach is effective, it may

offset some need for these investments in the near term.

As previously discussed, approximately 16% of customers using CTR unload less than 150 pounds. A typical household might generate on average 150 pounds and will pay about $21 per month for waste collection. Every household or business in the County can subscribe to waste and recycling collection services. Since customers have alternatives for waste disposal, reducing hours or days the transfer stations are open may reduce traffic assuming more households subscribe to regular services.

3.4.3.2 – Options for Modifying Hours and Days of Operation

Transfer station operating hours are primarily set to receive waste from collection route trucks. These collection trucks, typically from residential routes, make two trips per day to the transfer station to unload. Upon examination of the delivery schedule at all stations, most of the collected waste is received before 3:30 p.m. each day. However, the stations remain in operation until all waste received is loaded into trailers and transported to the barge facility at the Port of Vancouver or transferred to the landfill, as is the case at the Washougal Transfer Station.

Both West Van and CTR are open 12 hours per day, from 6 a.m.–6 p.m. Monday–Friday. Therefore, the transfer stations are open to accepting self-haul/cash customers until 4:00 p.m. eachday. One approach to reducing overall traffic might be to decrease the time the facility accepts self-haul traffic from 12 hours to eight hours per day from 8 a.m.–4 p.m. In reviewing the data of a peak week in 2017 at CTR, the number of customers arriving outside those hours was about 16%, or 96 out of an average of 600 customers per weekday. Reducing hours may incentivize some customers to either subscribe to collection service or they may elect to arrive during the eight hours the facility is open. In either case, the peak traffic hours will either increase or stay the same. The challenge at the station is managing the peak traffic arriving between 9 a.m. and 3 p.m. Adding traffic during peak hours only exacerbates the problem.

The exception to this is Washougal that receives self-haul customers only three days per week (Wednesday, Friday, and Saturday). The reduced operating days are because of the limited number of stalls to unload and marginal space available to handle the amount of waste from collection trucks during the week. Reducing the hours of operations does not appear necessary at this facility.

Modify Times by Changing the Number of Days of Operation

The CTR transfer station is open seven days per week; West Van is open every day except Sunday; and Washougal is open only Wednesday, Friday, and Saturday for residential self-haulers. The option of opening both Washougal and West Van to self-haulers customers on Sundays is another approach that may reduce weekend traffic at CTR. CTR receives almost 800 vehicles on a given Sunday during the peak months of May through September. If 25% of the traffic at CTR were to travel to one or the other stations, that could result in a reduction of 200 per day on weekends. This could reduce the traffic and the potential for off-site queueing at CTR.

In addition, and perhaps even more important, is opening on Sundays offers an increase in services by the County at those locations. The Washougal station does experience some off-site queue issues at certain times. The station has limited spots to unload and by opening the facility to self-haul traffic on Sundays, it may relieve some of the peak traffic experienced on Saturdays. At West Van, there are no known queue issues, but opening on Sundays will not only provide a higher level of service to the City of Vancouver residences and businesses, but it may have an impact on traffic at CTR.

Analysis of Increasing Days of Operation

Opening both West Van and Washougal on Sunday will increase the cost of the services. The operational cost per hour at the West Vancouver and Washougal Transfer Station is $794 and $321, respectively. These costs, however, represent the average cost per day assuming all commercial and self-haul traffic and waste flows. If the facility were to open to just receive waste from self-haul customers, the cost per hour to operate the facility would require less labor and operators. This is because 80% of the waste delivered at West Van during weekdays is from collection trucks that do not collect on weekends. With less staff needed and less waste to load into trailers, the cost to operate on weekends is less than on a typical weekday.

For this analysis, the staffing would include gatehouse personnel, laborers or spotters, and a few operators. Since the waste delivered is expected to be less than 100 tons, the amount of waste to be loaded for transfer would be three to four trailers or containers over the eight hours. These costs do not include the HHW facility or waste transport and disposal. Therefore, for this analysis it is assumed the cost to operate would be about 75% of the cost to operate a typical day. This is shown in Table 3.14 below.

The table below displays two scenarios. The first is to open both the West Van and Washougal every Sunday of the year. The second option suggests opening the transfer stations only during the peak season (about six months of the year).

Extending the hours of operation to Sundays at WestVan and Washougal for eight hours (8 a.m. to 4 p.m.) would cost $595 and $241 per hour of operations, respectively. The added cost to operate West Van on Sundays could range from $124,000 to $248,000 per year depending on the number of weeks it is open. The Washougal transfer station would range from $50,000 to $100,000 per year.

Table 3.14: Cost of Sunday Operation Hours

Costs Items	West Van	Washougal
Average Facility Cost/Hr. /Full Operations	**$794**	**$321**
Cost /Hr. to Operate Sundays (75%) of full operations	***$595***	***$241***
Sunday Cost (8-hour day)	$4,760	$1,928
Cost per Year (Rounded $000)	**$248,000**	**$100,000**
Ave. Saturday Customer Traffic	289	208
Cost per Customer	$16.50 + Disposal	$9.25+ Disposal
Total Cost for Peak Season (6 months)	**$124,000**	**$50,000**

Assuming these costs are paid by the customers, the fixed cost to operate would be $16.50 per vehicle at West Van and $9.25 per vehicle at Washougal. This assumes that the number of vehicles would be similar to what these facilities receive on a typical Saturday. The number of vehicles would most likely be less, especially in the near term, but most likely would increase over time.

Expanding the days of operations at the West Van and Washougal Transfer Stations may result in decreasing the traffic at CTR. But more importantly, it provides a higher level of service to the communities they serve. There will be an increase in the total cost to operate the facilities. This can be offset by the current fee structure or by adopting a fee structure that included a minimum charge for a minimum weight approach. The approach was discussed to charge $25 per vehicle

with a minimum load of 300 pounds of trash. Loads with more than 300 pounds would be charged on a weight basis.

Analysis for Modifying Operating Hours or Days of Services at Transfer Stations

In completing a preliminary review of the options to reduce or expand the hours of operations and/or reduce the number of days available for self-haul or cash customers, it appears there would be little impact on overall operations. Certainly, regular users of these services would be inclined to arrive when the facilities are open. In most cases, this will cause increased customer traffic during fewer hours, exacerbating traffic during peak hours. A potential unintended consequence of reducing hours and days for disposal is an increase in illegal dumping.

If the hours are reduced, it should be in conjunction with changes to collection services, such as bulky waste pickup, to provide residents with a reasonable alternative to self-hauling.

The option of expanding the days of operations at both West Van and Washougal appears to be more practical and provides increased services to those communities. It will increase the cost of these operations but, with further analysis of the actual added cost to be provided by CRC, it is expected the tip fees and revenues generated by these new customers may be sufficient to offset costs.

3.5 Summary and Recommendations of Service Options

This section of the regional study considers the current services offered in cities and the County for collecting solid waste and for transferring waste to a processing and final disposal facility. The primary focus is to determine if modifications to these services would have an impact on the number of self-haul customers that use the transfer stations and possibly improve operations and impact the need to make large capital investments in the stations. The report includes a discussion of the options for the County, its partner jurisdictions, and CRC to consider. A summary matrix on p. 3-27 was prepared that discusses the advantages and disadvantages of these options.

Suggested Recommendations

Modify Level of Collection Services

There were two options presented and evaluated that considered changes to the current collection services and the impact they may have on traffic and operations at transfer stations.

Option 1 – Expand Universal Services to the Urbanized County and the Cities of Battleground, La Center, and Yacolt.

The reasons to expand universal services for all in the County go beyond the purpose of this study. Universal services can improve overall efficiency in the system, reduce traffic and litter on roads, and reduce air quality impacts on local communities. Based on the study, the direct benefits to reducing traffic at the transfer stations could not be established. More data and feedback from the public are needed. In addition, such changes should be based on policies adopted by each local jurisdiction and would also require coordination with the UTC.

Option 2 – Establish Bulky Waste Collection Programs

Similar to universal collection services, there was not sufficient data to determine how much an impact these collection programs may have on the traffic at transfer stations. On-call services are

provided, and the transfer stations provide a convenient place for households and businesses to take unwanted bulky items. Having this service reduces the potential for illegal dumping.

Recommendation 1 – The County should further evaluate the options of expanding bulky waste collection services in conjunction with updating the Solid Waste Management Plan. This would allow the County to execute a process to obtain feedback from the general public and local officials to consider the broader policy implications of adopting changes to the collection services.

Modify facility fee structures – Minimum load requirements and fees to encourage customers to use collection services. The study determined that the current rate structure does not offer a deterrent for individuals to haul their own waste. More significant is that those who self-haul with small loads are not paying for the actual cost of the services. These customers are being subsidized.

Recommendation 2 – The County should adopt a policy that customers pay for the actual cost of the services provided and minimize the potential for unintended subsidies of other user classifications. Setting a suggested minimum rate of $25 per customer with a minimum load of 300 pounds appears to be fair based on the information analysis presented in this study. It is also expected to encourage households to either subscribe to collection services and/or reduce the number of trips by incentivizing them to make fewer trips with larger loads.

Modify the hours or days transfer stations are open to self-haulers – Each transfer station is open to the public on various days and times. CTR is the only facility open on Sundays and as a result, often experiences high traffic on weekends particularly during the peak season. This does contribute to times where vehicles will queue onto the public right of way. The study could not establish a definite correlation if the weekend traffic would be impacted if both West Van and Washougal were open on Sundays. Nor is it logical that modifying the hours at CTR would impact the peak traffic and reduce traffic issues. But, by opening all stations on Sundays may result in more efficient and uniform services.

Recommendation 3 – The County should work with CRC to expand operating hours at the Washougal and West Van on Sundays. One approach would be to initially open these facilities on Sundays during the peak season (six months). This would minimize the increase in the added expense of operating an extra day plus it would provide data and feedback as to the benefits and impacts of adding this service.

Summary Matrix – Service Options for Collection and Transfer Stations					
	Description	**System Impacts**	**Cost Impacts**	**Pros**	**Cons**
Strategies to Modify Collection Service					
1. Expand Universal Services	Expands universal services to urbanized areas of county-based on density or other standard	Increase participation in collection services. • Increase recycling • May reduce traffic at transfer stations • May reduce fugitive litter and less traffic on roads • Improve overall efficiency of collection services	May decrease cost of services if more households subscribe	Most efficient for residences to use collection system Less traffic on roads May impact neighbor clutter	Some residents may resist requirements to subscribe particularly in rural areas.
2. Bundle Bulky Waste w/ Standard Collection	Add to regular collection services provision to pick up bulky items. Program can be designed to pick up seasonally or alternative schedule	Residences have convenient alternative for disposal of unwanted items i.e., bulky items furniture. May reduce traffic at transfer stations.	Expected to increase monthly rate to residences and/or businesses	Provides convenient collection of used bulky items May help clean up of neighborhoods May reduce illegal dumping May reduce traffic at TS	May impact drop off at reuse stores i.e., Goodwill etc. May cause clutter in neighborhoods if system is abused
3. Conduct Bulky Waste Collection Events	At least annually or seasonally provide special events for collector of bulky waste. Program can be designed for different areas throughout year.	Provides an alternative for residences to dispose of bulky items vs transport to transfer stations	Will increase rates to residences unless program includes a drop off fee	Provides alternative for residences to dispose of bulky waste items. May reduce clutter in neighbor hoods May reduce traffic at transfer stations	May impact drop off at reuse stores i.e., Goodwill, etc. May cause clutter in neighborhoods if system is abused Events not as convenient as going to transfer station

Strategies to Modify Rates					
1. Maintain Current Rate Policy at TS	TS will continue to charge $10 Fee + Weight of waste disposed at TS	No expected changes No impact of transfer station operations	As traffic increases the cost of services at transfer stations will increase Added capital to increase space to handle self-haul traffic	No change in rate system that has been in place for several years	Self-haul / cash customers will not pay the cost of service Collection services subsidize self-haul at TS
2. Establish Rates Based on Cost of Services	Establish fees based on policy to have self-haul/ cash customers pay the actual cost of services to use transfer stations.	May reduce traffic or those customers as potentially more residences subscribe to collection services. Could cause an increase in illegal dumping	Impacts cost and revenue at transfer stations.	Expected to reduce some traffic at transfer stations Customers will each pay for the level of services provided May incentivize residences to subscribe to collection vs self-haul	May increase illegal dumping due to increase in self-haul
3. Set Minimum Rate	Establish a minimum rate to offset the actual cost of services and to provide some incentive to self-haul customers to subscribe to the collection.	May result in less traffic @ transfer stations • Some customers might subscribe to collection • Self-haul customers will increase loads and reduce the number of trips • May Increase in Illegal Dumping	Projected to increase revenue and possibly cover the cost of services May reduce the cost to operate with less traffic	Expected to reduce some traffic at transfer stations marginally Customers will each pay for the level of services May incentivize residences to subscribe to collection vs self-haul Less traffic on roads and less litter on roads	May increase illegal dumping

Revise Hours and Day of Operations					
1. Maintain Current Hours of Operation	No change in the hours of operations at TS	No Impacts			
2. Modify Hours at CTR and other transfer stations as necessary	Reduce hours for SH and Cash customers to use TS	May reduce some traffic at TS May increase traffic at peak times causing more congestion	May reduce the cost of TS operations by shorter hours If customer traffic is reduced this option may reduce the need for TS improvements in the immediate future	Could reduce the cost of operations and reduce overall traffic May increase subscriptions by households using collection system	May cause an increase in illegal dumping
3. Modify days of operations at transfer stations	Propose opening both West Van and Washougal to self-haul customers on Sundays	Provides a higher level of service to customers in service areas May impact /reduce peak traffic at CTR	Increase cost of operations at transfer stations Revenues generated may offset most of the cost	Additional days of operations provide more options for customers. May reduce peak traffic during weekdays and on Saturdays	May deter some households from subscribing to collection services Adds costs to operate

Chapter 4

Regional Transfer Stations - Operations & Condition System Assessment

The Clark County Transfer Stations provide convenient locations to deliver household waste and yard debris and to discard bulky waste items. The West Van and CTR were constructed in the early 1990s. Neither facility has been expanded to handle the increased volume of waste from the population growth within the County. This section discusses the current CTR facilities and their capacity as it relates to providing services and for handling waste over the next 15 years.

4.1 Introduction

The comprehensive review of the Regional Solid Waste System is primarily focused on assessing thecurrent infrastructure or facilities. The assessment entails examining the physical condition of the facilities and identifying repairs and replacement needs. It also examines the operating conditions for managing both current waste volumes and customers as well as assessing improvements needed to manage growth.

The chapter presents the reviews of both the physical and operating conditions for managing solid waste services for the next 20 years. The findings will be used to identify the investments needed to continue providing cost-effective and efficient services. The Assessment was completed by working with CRC staff to conduct site visits, review data, and discuss findings.

4.2 CTR Operating and Conditions Assessment

CTR is located on Washington State Route 503 in central Clark County near Brush Prairie. It serves the largest area of the County, the area projected to have the most growth over the next 20 years. The facility was designed to handle 1,200 tons of municipal solid waste (MSW) daily from WCW and self-haulers. In addition to managing the area's waste, CRC operates a recycling and moderate risk (household hazardous) waste drop-off facility. Figure 4.1 below provides an aerial photo of the site operations.

Figure 4.1: Current CTR Site Plan

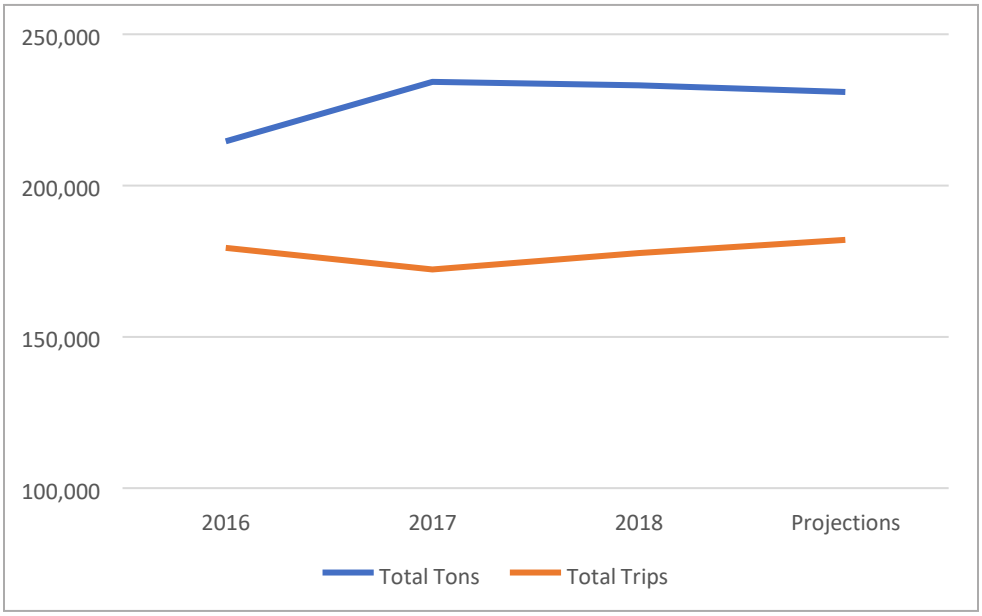
4.2.1 – CTR Waste Quantities

Over the past three years, CTR has experienced a significant increase in annual waste volume received, from 215,000 tons in 2016 to 233,000 tons in 2018. However, as shown in Table 4.1 and Graph 4.1, projections for 2019 indicate no increase from the previous two years.

Table 4.1: CTR Tons and Trips

Tons	2016	2017	2018	2019
Cash	45,141	52,866	48,117	49,859
Commercial	22,775	27,344	23,775	23,883
Route Trucks	107,382	112,176	116,143	113,338
WCW Drop Box	39,272	41,868	45,009	41,956
Total Tons	**214,570**	**234,254**	**233,045**	**229,036**
Cash	142,288	133,144	136,773	135,293
Commercial	14,462	15,929	14,172	13,879
Route Trucks	11,957	12,025	14,063	13,635
WCW Drop Box	10,681	11,131	12,695	12,175
Total Trips	**179,388**	**172,229**	**177,703**	**174,982**

Graph 4.1: CTR Historic Waste Quantities and Traffic



Although the amount of waste received has remained constant over the last three years, based on the population, and resulting waste projections, the area served by CTR is expected to grow faster than the rest of the County. This growth is projected primarily in the cities of Ridgefield and Battleground and in the area north of Northeast 119th Street and west of State Route 503.

CTR is open seven days per week. The majority of the waste at CTR is received during weekdays (Monday through Friday) when large hauling trucks operate. Waste quantities delivered to CTR vary depending on the season. During the summer months (May through August), weekly waste averages 4,771 tons. This increase in waste volume, when compared with the rest of the year, is primarily due to increased traffic from self-haulers and construction activity. CTR is permitted to operate for only 12 hours per day, so all waste must be loaded into trailers and transported off-site within that period. The peak waste quantities received per week at CTR in 2017 and 2018 are detailed in Table 4.2.

Table 4.2: CTR Peak Waste Quantities per Week (tons)

2017	**Week of July 16th**							
	Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Total**
	192	**928**	**822**	**929**	**855**	**973**	**198**	**4,897**
2018	**Week of June 17th**							
	Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Total**
	124	**1,192**	**1,003**	**951**	**995**	**1,006**	**179**	**5,449**

During the weekday peak weeks shown in Table 4.2, the average waste received is approximately 900 tons per day. Waste Connections collection vehicles deliver approximately 667 tons per day, or 74%, while self-haul vehicles deliver about 230 tons per day or 26%. Additionally, CTR experiences 250 vehicles per day or about 30 per hour that use the recycle and hazardous household waste (HHW) drop-off facilities.

On weekends, the amount of waste received averages approximately 180 tons per day. On Saturdays, CTR does receive waste from a limited number of WCW collection vehicles; however, the average is seven vehicles for a total of 50 tons per weekend. During certain holidays, such as Thanksgiving, Saturdays can experience as much as 600 tons or more because Waste Connections makes up for the skipped collection day.

CTR receives almost 900 tons of waste each weekday. It requires 25 minutes to load a transfer container with the current compactor system. Over the 12-hour (720 minutes) approved workday, CTR can load 29 containers for transportation to the Tidewater loading dock. The containers average 30 tons each; therefore, the MSW capacity of the station, as constrained by permitted operating hours, is about 870 tons per 12-hour day.

4.2.2 – CTR Traffic Conditions

Of the three transfer stations operated by CRC, CTR serves the largest area and therefore has more traffic. During the average week in 2019, the total number of customers was 3,532. However, 35% of all traffic occurs on the weekends. During the weekday, the primary customers are Waste Connections collection trucks. As shown in Table 4.3 on the next page, the average

weekday traffic ranges from 419 to 598 vehicles. During peak summer weeks, the average weekday traffic ranges from 497 to 713 vehicles, an average of 172 more, as detailed in Table 4.4 below.

Table 4.3: 2019 Average Weekday Number of Hourly Trips

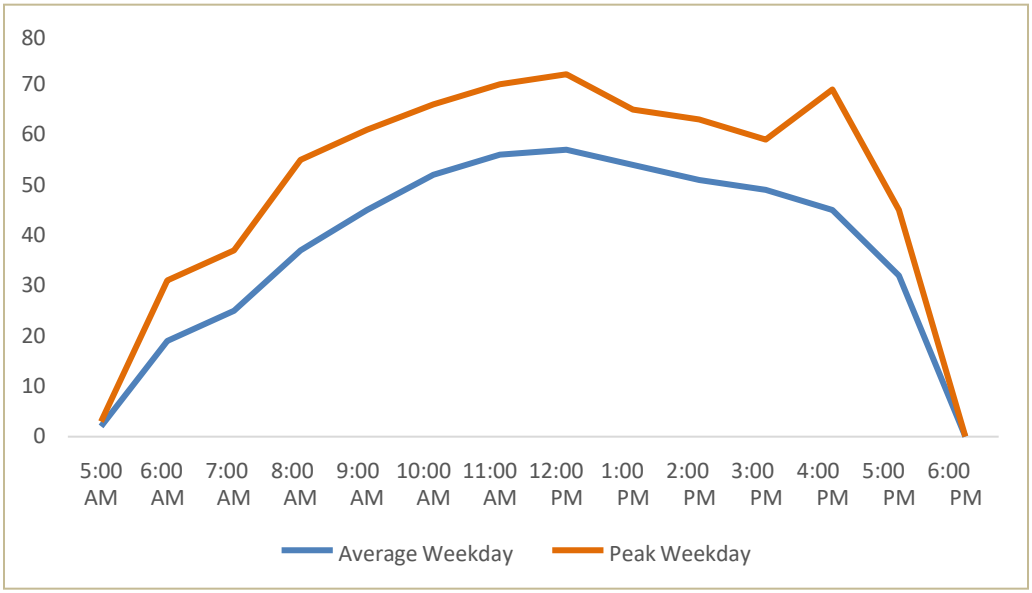
Workdays:	**29**	**30**	**30**	**31**	**30**	**30**	**30**	
Time of Day	**Sun.**	**Mon.**	**Tues.**	**Wed.**	**Thurs.**	**Fri.**	**Sat.**	**Weekly Totals**
5:00 AM	0	2	1	1	1	1	0	6
6:00 AM	0	19	15	14	13	17	0	78
7:00 AM	7	25	26	21	20	25	10	134
8:00 AM	61	37	34	30	29	38	55	284
9:00 AM	61	45	41	39	36	46	57	325
10:00 AM	71	52	49	47	45	51	66	381
11:00 AM	77	56	52	47	44	54	74	404
12:00 PM	80	57	49	49	43	53	75	406
1:00 PM	80	54	51	46	45	54	78	408
2:00 PM	80	51	47	45	44	47	79	393
3:00 PM	78	49	42	43	40	44	79	375
4:00 PM	3	45	38	37	36	41	5	205
5:00 PM	0	32	26	26	23	26	0	133
6:00 PM	0	0	0	0	0	0	0	0
Total:	**598**	**524**	**471**	**445**	**419**	**497**	**578**	**3,532**
Bright yellow shading indicates CTR's peak weekday.								
Orange shading indicates CTR's peak hours.								

Table 4.4: 2019 Peak Weekday Number of Hourly Trips

	7-Jul	**8-Jul**	**9-Jul**	**10-Jul**	**11-Jul**	**12-Jul**	**13-Jul**	
Time of Day	**Sun.**	**Mon.**	**Tues.**	**Wed.**	**Thurs.**	**Fri.**	**Sat.**	**Weekly Totals**
5:00 AM		3		1	2	1		7
6:00 AM		31	24	25	14	21		115
7:00 AM	6	37	37	31	31	37	20	199
8:00 AM	81	55	36	39	37	44	65	357
9:00 AM	78	61	65	31	42	55	78	410
10:00 AM	83	66	61	46	51	56	71	434
11:00 AM	88	70	69	59	45	60	80	471
12:00 PM	90	72	56	49	45	65	83	460
1:00 PM	97	65	76	48	49	67	76	478
2:00 PM	105	63	56	46	64	61	76	471
3:00 PM	85	59	58	47	59	51	81	440
4:00 PM		69	56	40	38	49	2	254
5:00 PM		45	39	35	28	29		176
6:00 PM			1		1	1		3
Total:	**713**	**696**	**634**	**497**	**506**	**597**	**632**	**4,275**
Yellow shading indicates CTR's peak weekday.								
Orange shading indicates CTR's peak hours.								

Graph 4.2 shows the hourly customer traffic on Monday, the busiest weekday at CTR. It compares the hourly traffic to the average weekday traffic during the peak season. During the busiest five-hour period, the hourly traffic is about 20 vehicles per hour more during the peak summer season. (Note: The blue line on the graph in Graph 4.2 corresponds with the Monday column in Table 4.3, and the orange line corresponds with the Monday column in Table 4.4.)

Graph 4.2: 2019 Weekday (Mondays) Customers to CTR — Hourly Arrivals



What is most critical to the operations is the consistent stream of customers arriving from 8:00 am to 3:00 pm. During these eight hours, the facility needs to handle more than 60 vehicles per hour.

Although CTR has experienced a steady number of customers during weekdays over the past three years, the busiest periods for the station occur on Saturdays and Sundays. Tables 4.5 and 4.6 on the next page detail the number of weekly customers at CTR. From 8:00 am to 3:00 pm, traffic averages 72 customers per hour, peaking at 80 vehicles per hour.

During the summer season, CTR receives almost 800 vehicles per day on the weekend, peaking at or near 100 vehicles per hour. Graph 4.3 on page 4-4 compares peak weekend traffic with average weekend traffic. (Note: The blue line on the graph in Graph 4.3 corresponds with the Saturday column in Table 4.5, and the red line corresponds with the Saturday column in Table 4.6.)

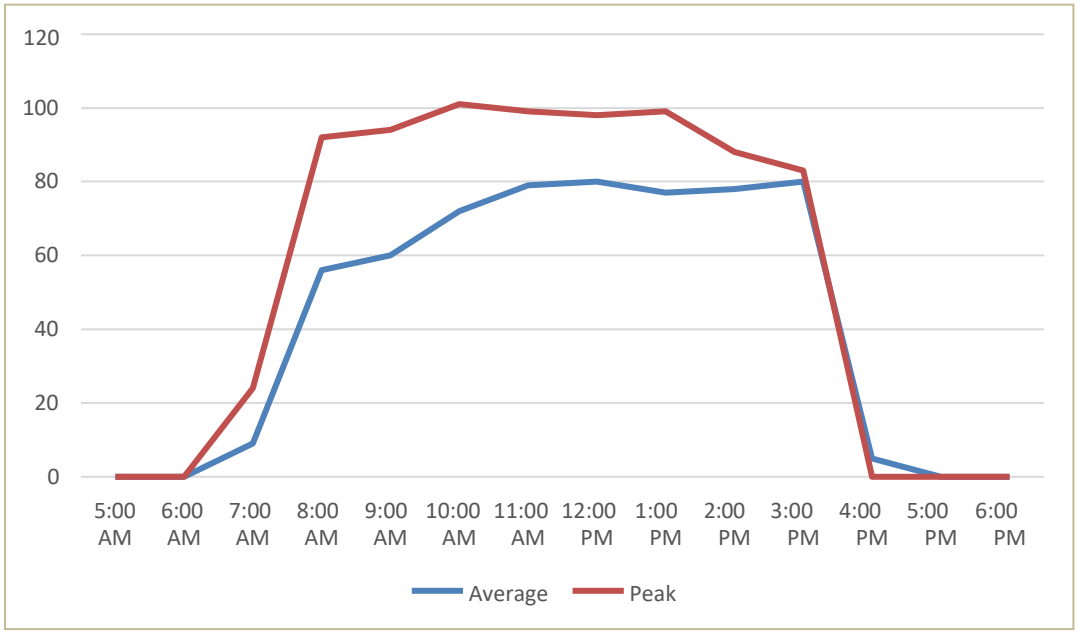
Table 4.5: 2017 Average Week

	Workdays							
Time of Day	**Sun.**	**Mon.**	**Tue.**	**Wed.**	**Thur.**	**Fri.**	**Sat.**	**Weekly Totals**
5:00 AM	0	1	1	1	0	1	0	4
6:00 AM	0	15	14	14	15	15	0	73
7:00 AM	6	23	25	23	22	24	9	132
8:00 AM	54	38	32	32	34	37	56	283
9:00 AM	57	46	41	39	41	43	60	327
10:00 AM	67	50	48	46	45	51	72	379
11:00 AM	74	52	49	48	46	54	79	402
12:00 PM	76	52	49	43	46	53	80	399
1:00 PM	77	51	47	45	47	52	77	396
2:00 PM	73	50	44	44	44	49	78	382
3:00 PM	71	48	42	40	39	46	80	366
4:00 PM	3	43	37	37	35	38	5	198
5:00 PM	0	28	24	24	22	23	0	121
6:00 PM	0	0	0	0	0	0	0	0
Total:	**558**	**497**	**453**	**436**	**436**	**486**	**596**	**3,462**
Bright yellow shading indicates CTR's peak day.								
Orange shading indicates CTR's peak hours.								

Table 4.6: 2017 Peak Week

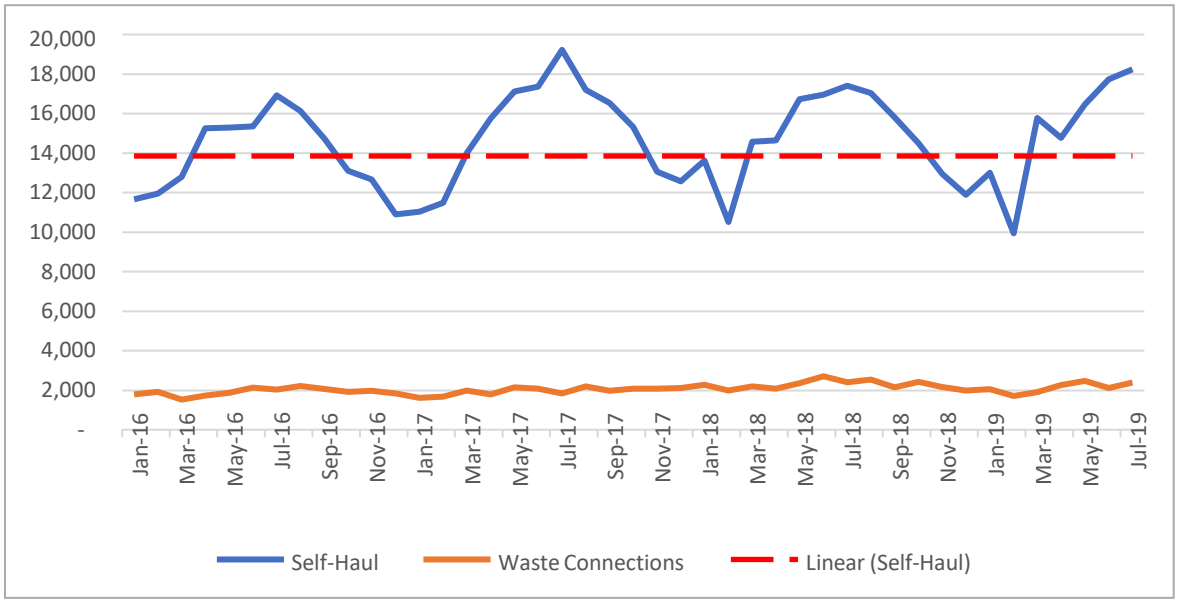
	21-May	22-May	23-May	24-May	25-May	26-May	27-May	
Time of Day	**Sun.**	**Mon.**	**Tues.**	**Wed.**	**Thurs.**	**Fri.**	**Sat.**	**Weekly Totals**
5:00 AM			1	4		1		6
6:00 AM		27	13	19	24	30		113
7:00 AM	17	40	34	35	28	43	24	221
8:00 AM	73	57	47	32	45	63	92	409
9:00 AM	101	55	64	56	57	54	94	481
10:00 AM	90	73	44	53	59	66	101	486
11:00 AM	93	54	68	59	50	68	99	491
12:00 PM	103	63	49	47	56	66	98	482
1:00 PM	102	60	45	56	58	72	99	492
2:00 PM	84	58	42	45	62	62	88	441
3:00 PM	81	49	45	68	45	56	83	427
4:00 PM	1	36	39	45	46	52		219
5:00 PM		34	41	42	36	26		179
6:00 PM								0
Total:	**745**	**606**	**532**	**561**	**566**	**659**	**778**	**4,447**
Yellow shading indicates CTR's peak weekday.								
Orange shading indicates CTR's peak hours.								

Graph 4.3: 2017 Peak (Saturday) Customers Compared with Average



The increase in customers over the past three years has greatly contributed to the increased traffic that regularly backs onto State Route 503. CTR was not designed to handle the amount of traffic or waste it is experiencing under the current conditions. Another consideration in assessing customer traffic at CTR is seasonal impacts. Graph 4.4 below depicts the inbound traffic to CTR over 43 months. Self-haul traffic fluctuates in a seasonal pattern, whereas traffic from Waste Connections collection vehicles remains steady.

Graph 4.4: CTR Inbound – January 2016 to July 2019



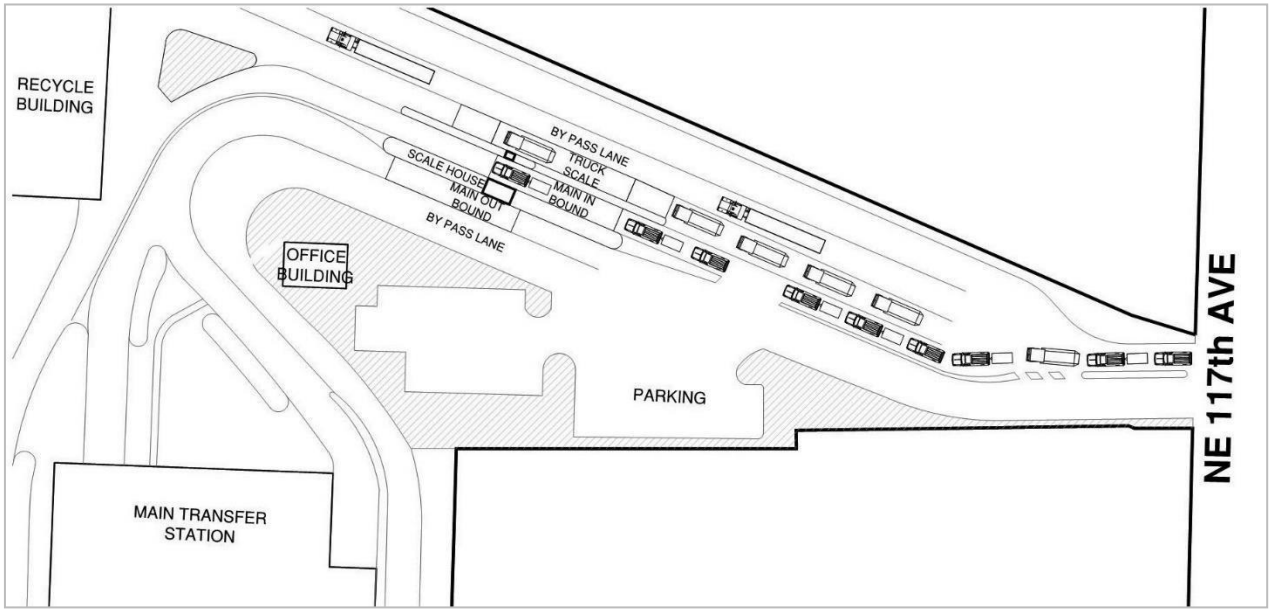
The trend in waste tons, which is depicted on the graph by the red dashed line, reveals the increase in waste tons delivered to CTR over this period. Data provided by the Washington State Office of Finance and Management and confirmed by Clark County's Growth Management Plan, estimate an increase in population between 77,000 and 92,000 over the next 20 years for the north-central part of the County. The largest increase in population will occur in the CTR service area. Population growth is directly related to growth in waste generation. At the expected levelsof growth, an additional 62,000 to 73,000 annual tons (170 to 200 tons per day) of waste will be handled by the County's solid waste system, with a majority delivered to CTR.

4.2.3 – Scale House Operations

CTR customers are charged by weight, based on the amount of waste they bring to the station. Customers arriving at the station must weigh in across the scale system, which includes two scales. One scale is dedicated to weighing inbound Waste Connections collection trucks. These vehicles have registered tare weights and therefore do not need to be weighed out, and so they exit using the bypass lane.

All self-haul vehicles (including cars and pickups with or without trailers) are weighed on the main inbound scale, where an attendant provides a ticket upon entering the site. If a vehicle is using only the recycle or HHW drop-off center, they do not need to weigh in and can use a separate bypass lane, for lane entry and also for an exit. Figure 4.2 below shows the two in-bound scale lanes,the outbound lane, and the by-pass lanes.

Figure 4.2: Existing Scale House Complex



After being weighed in, vehicles enter the transfer station to unload. Upon completion, self-haul customers line up to weigh out on a separate outbound scale. The scale house attendant will enter the ticket, determine their fee, and process payment.

A key factor in managing customer traffic is how much time it takes to process and receive payment from inbound and outbound customers. Under the current system, the average time to

weigh customers is approximately 45 seconds. At this pace, the main inbound scale system can process 80 vehicles per hour. During weekends there are almost 100 vehicles per hour; therefore, queueing issues are understandable.

Similarly, there is only one outbound scale. The average time to complete a transaction is about 45 seconds, the same as the inbound scale. The result of processing outbound customers at the same rate as the inbound causes onsite queueing. Slow processing of outbound customers could be acceptable if the queuing line did not back into the transfer station where customers are unloading.

Several options can be considered to remedy this problem. The first option being considered by CRC and the County is to add a second inbound scale and increase the length of the queue lane. Using this approach, a second inbound scale would be located on a separate parcel just west of the current property, but on the same site. Channel lanes are proposed to improve the ingress/egress off State Route 503 that will allow two dedicated lanes to enter the station. Inbound customers arriving from the south and turning left into the site would have a dedicated lane and would not compete with traffic turning right from the north. These improvements would be expected to eliminate the potential for offsite queueing.

From the data reviewed, another option CRC should consider is increasing outbound scale capacity or changing procedures to expedite fee collections. Some examples of potential changes in procedures are charging minimum fees for small loads (not requiring weight) or using faster payment processing software.

4.2.4 – Site Circulation and Unloading Stall Capacity

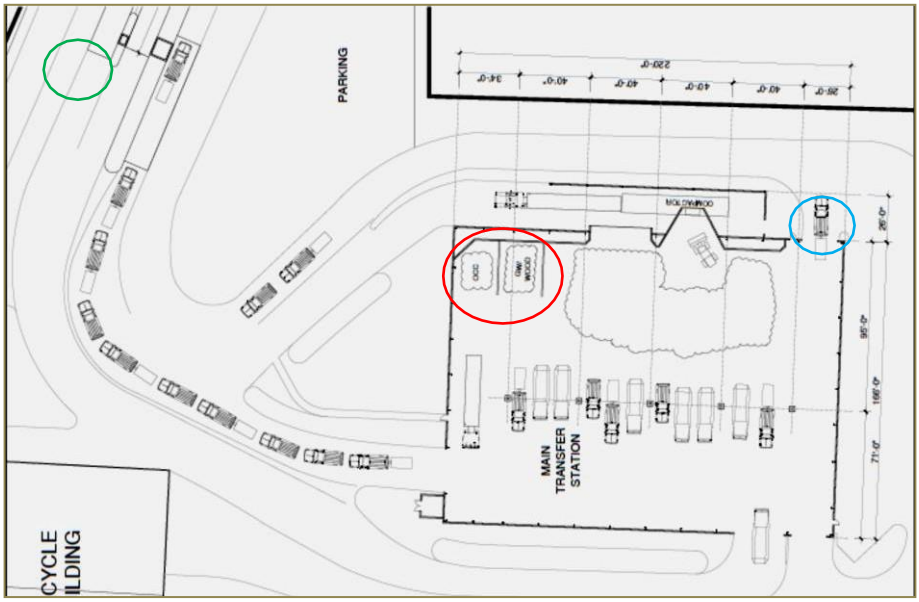
When CTR was constructed in 1992, it was not designed to accommodate the current levels of traffic, or the different activities and services currently provided.

Daily traffic at CTR averages 50 to 60 vehicles per hour. An unloading stall is expected to handle six vehicles per hour ─ 10 minutes per vehicle to maneuver into the stall, unload, and exit. Some vehicles, such as cars and pickups with less waste, will unload faster. However, vehicles with trailers and those with hydraulic tippers typically take longer. Therefore, in non-peak times, 10 to 12 stalls are sufficient for unloading.

During peak times, customer traffic can increase from 80 to as many as 100 vehicles per hour. At this volume, the facility would need to dedicate 13 stalls to unloading during peak weekday times and 17 to 20 stalls during peak weekend times. Figure 4.3 on the next page shows the tipping floor and vehicle unloading capacity (north is the left side of the figure). With the two northernmost stalls dedicated to source-separated cardboard, green waste, and clean wood (red circled area), there are only 13 stalls for unloading waste. On weekends, CTR can use the south drive aisle to route vehicles to unload. After unloading, these vehicles will exit the southeast door (blue circle) and drive to the outbound scale (green circle).

Also depicted in Figure 4.3 is how transfer trucks, when loaded, exit the facility. The truck and trailer must intersect with other outbound traffic and will need to access the scale.

Figure 4.3: Tipping Floor Capacity



CRC does a good job managing traffic and ensuring vehicles can safely unload in the transfer station. Spotters are located at the entrance and on the tipping floor to guide customers to the appropriate stalls. Although the current facility does not have enough stalls to unload quickly during peak times, there is space for customers to queue on site before entering the transfer station. However, when exiting the transfer station from the southeast door (blue circle), there is approximately 550 feet before the outbound scale, queue space for 20–22 vehicles. Routing vehicles in this direction can reduce the traffic queue exiting the transfer station.

The amount of customer traffic on weekends and during peak seasons also impacts the overall site circulation. The primary place of congestion is the outbound lanes before the scales. As shown on the site circulation map in Figure 4.4, all traffic must converge on two lanes including transfer trucks loaded with containers bound for the Tidewater loading dock.

Figure 4.4: CTR Site Circulation

Outbound traffic conditions may be improved by decreasing the time to process customers; however, the physical space for vehicles to line up to be weighed out as well as those to use the bypass lane is very limited. If the station is to make improvements to eliminate the off-site queue, it would also be desirable to consider modifications to remedy both the outbound scale capacity issues and the site circulation restrictions.

4.2.5 – Impacts of Growth Management in CTR Service Area

As discussed in Chapter 2 of this report, Clark County has grown about 2% per year since 2010 (approximately 60,000 people from 2010 to 2019), and it is expected to continue at this rate for the next 20 years. The central and northern portions of the County, served by CTR, are expected to experience the majority of this growth, as predicted in the Growth Management Plan. The projected growth for this area could result in more than 60,000 tons of additional waste being generated per year in the next 20 years.

Growth has resulted in increased development around CTR. The apartment complex on the north side of CTR expanded and now sits within a few feet of the north retaining wall. Property on the west side of 112th Street is being platted and developed for new single-family houses. On the south side of the transfer station, a storage unit facility and private school are being constructed. CRC owns the eight acres located on the west side of CTR, providing a buffer between the new residential development and the transfer station. A new scale complex designed to eliminate off-site queueing problems is proposed by CRC for this property. These recent changes in the development of adjacent properties will impact decisions for future changes to operations and future facility improvements.

Considering the increase in volume and number of self-haul customers, CTR is currently at operating capacity. This operating capacity is based on current waste quantities and hours of operation at about 900 tons per day (TPD). If the waste exceeds the capacity, CRC will process the waste to ensure it is removed from the tip floor and not stored overnight. There were several observed deficiencies during the consultant team's site visits and review of data. It is important to understand that these deficiencies are a result of the physical conditions and limitations of the original design. CRC executes day-to-day operations to manage the current waste streams and traffic safely and efficiently, given these physical constraints.

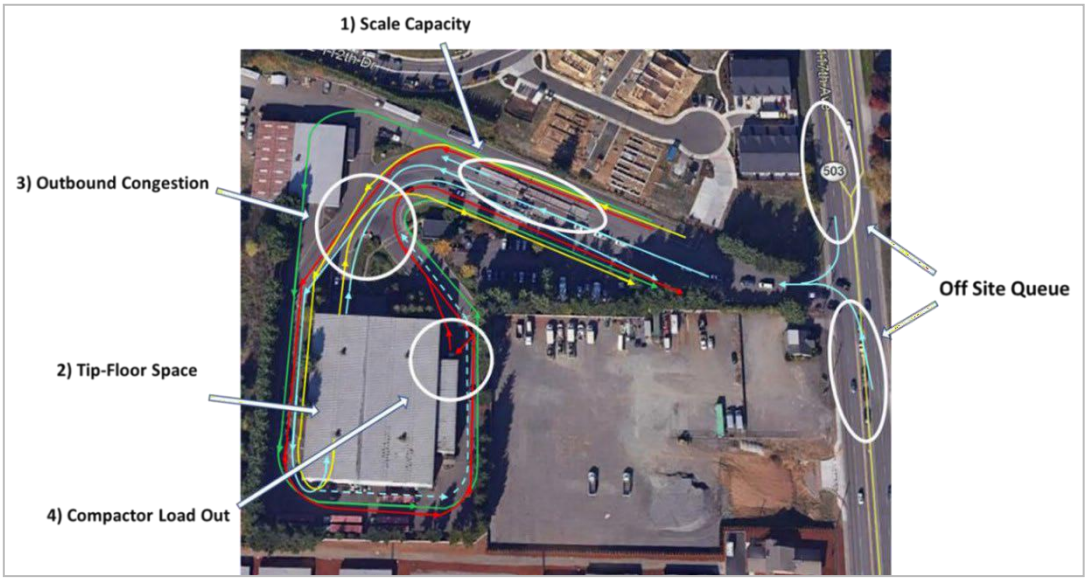
Based on the assessment of current operations, the following site constraints and deficiencies were noted (as shown in Figure 4.5 on the next page).

1. **Scale capacity:** CRC is currently planning to add a second in-bound scale to increase the queuing for inbound traffic. This is a high priority and work is underway to secure approval by the Washington Department of Transportation.
2. **Tipping Floor Space:** The current facility does not have sufficient space for vehicles to unload. This occurs on busy days during the week and regularly on weekends during most of the year. Also, collection trucks must unload next to self-haul vehicles. CRC does a good job of monitoring and managing traffic to avoid accidents, but as customer traffic has increased in the past few years, this condition is less desirable.
3. **Congestion at Exit Lanes:** All traffic exiting the site must make a left turn onto two outbound lanes. Transfer trucks are subjected to a hairpin-like turn and therefore use both

lanes to access one out-bound scale. The competition for the outbound scale and exitingis not a desirable condition and is exacerbated by the increase in waste quantities and increase in self-haul traffic.

4. **Compactor Load-Out Capacity:** With the current operating hours (12 per day), the compactor can only loud out about 900 tons per day. CTR averages between 800 and 900 TPD. There are some days during peak periods CTR receives between 900 and 1,100 tons. CRC reported that on occasions when waste over this capacity is received, they will load this material to ensure it is not stored overnight.

Figure 4.5: CTR Operations Assessment



4.2.6 – Review of CTR Conditions Assessment

Our limited structural and site improvement condition assessment reveals that most of the assets at the site are in fair to good condition, except for the recycling building, paved areas east of the boundary retaining wall, and the infiltration portion of the stormwater system. The complete report is included as Appendix B, *Conditions Assessment Report.* A summary of the key points are as follows:

- The Transfer Station and HHW buildings (see Figure 4.1 on page 4-1) the north boundary retaining wall and the south boundary retaining wall are in **good** overall condition.
- The Recycling Building next to the HHW building is in relatively **poor** condition. We recommend that a detailed structural investigation be implemented as part of the planning process when considering public ownership of the site.
- The drive aisles that course through the site are paved with asphalt concrete pavement. Some areas of the paving are in very **poor** condition that requires rehabilitation. We recommend worn surface areas be repaired or replaced.

- The east boundary buffer is in **poor** condition due to the trees and tree roots impacting the pavement section and curb. The pavement section and the damaged curb should be repaired or replaced.
- The existing pump station for the sanitary sewer system is a duplex pump system with two pumps that alternate pumping discharge of the sanitary sewer effluent. According to facility staff, one of the pumps failed in September 2019 and was replaced in the fall of 2019. CRC provides routine maintenance of equipment. The pump station is in **good** condition.
- The scale house and the scale booth were not assessed since they were to be replaced shortly (it was replaced in December 2019). The domestic water system was not assessed since it is owned and maintained by Clark County Public Utilities.

Our structural and civil condition assessments were limited to those areas that are readily accessible and visible to the field staff. Concealed conditions that become exposed in the future may change our current recommendations. Our repair timeline will be provided as part of our facility alternatives analysis.

4.2.7 – CTR Service Area Alternatives

Every year, CTR receives more waste and increased customer traffic as the population in Clark County continues to grow. The most critical need is to make improvements that will eliminate customers from queueing onto State Route 503. CRC is working with the County and the Washington Department of Transportation to develop near-term plans to remedy this condition.

Based on the condition's assessment, the transfer station facility has been well-maintained and is in good condition. It is a critical component of the Clark County solid waste system. However, a range of improvements should be considered for the facility, depending on the determination by local officials of how CTR will fit into a long-term plan for managing solid waste in Clark County. Based on the assessment of the operations and the physical conditions, the following three options should be considered:

1. **Make major improvements to CTR to improve operations and mitigate potential impacts to neighbors and build a new transfer station.**

   CRC can make several investments to CTR to enhance onsite conditions, reduce impacts to neighbors, and improve operating efficiencies. This would entail expanding the facility on the west side property that was the site of a former landfill. Improvements include a new scale complex, staging and parking for trailers /containers, and expanding the transfer station building. These improvements would increase the facility's capacity to efficiently process the current volumes of waste received and manage future growth. Building on the adjacent property may require land use approval and there would need to be further examination of underlying soil conditions to verify the feasibility of this expansion. CTR is located minutes from Waste Connections' truckyard and located convenient access to the highway system and to the population it serves.

2. **Make minimal improvements at CTR and build a new transfer station.**

   Under this option, minimal improvements would be made at CTR targeted at remediating offsite queue issues and enhancing the facility's capacity to manage current waste flows.A fourth transfer station would be constructed within five years to serve the northern portion of the County. This site would receive waste and serve customers from Battle Ground, Ridgefield, and LaCenter, areas of anticipated high growth. The new transfer station would

be constructed to accept waste from self-haul customers and route trucks. It would be equipped with automated scales for route trucks and would be open a few daysper week for self-haul customers. The facility would be designed to expand with future waste demands.

3. **Make minimal improvements at CTR and build a new transfer station to serve the central and northern portions of the County within five years.**

   Immediate improvements would be made to CTR to remedy the current offsite queue issues. Concurrently, a new facility would be sited, designed, and built to handle the County's expected waste volume from growth synchronized with the transportation network and compatible with its adjacent neighbors/properties. Once the new transfer station was completed the existing CTR would be closed or potentially converted to a new MRF.

4.2.8 – Summary of CTR Operations and Conditions Assessment

The CTR station was built in 1992 and was not designed to handle the current waste volume and traffic conditions. The demand for services has greatly increased, particularly in the past five years. CTR is centrally located, has been well-maintained, and is in relatively good condition. Some improvements can be made to not only deal with the current off-site queue but also to improve overall site circulation and enhance the material handling needs. Changes include expanding the transfer station building to provide space for unloading and floor storage. The additional areas would provide space for unloading construction and demolition (C&D) waste for processing that could divert this material from the landfill. Added space to handle green waste and wood could also contribute to higher material recovery. The key question to address is what level of investment should be made at CTR in conjunction with other regional service needs.

The options presented will be evaluated along with the feasibility of other improvements to upgrade the system in Chapter 5.

4.3 West Vancouver Materials Recovery Facility and Transfer Station Operations and Condition Assessment

4.3.1 – Introduction

West Van was the second of the three facilities put into service to receive MSW from commercial collection trucks and self-haul customers in 1993. The facility is owned and operated by CRC and serves the majority of the City of Vancouver and its' central business district. It is the oldest of the three transfer stations operating in the County.

This section provides a description of the facility and an assessment of both the operating and physical conditions. The results will be used to identify the necessary capital improvements that are needed to enhance immediate services as well as determine long-term investments to satisfy longer-term services for this area.

4.3.2 – West Vancouver Material Recovery Facility and Transfer Station (West Van)

West Van is located on a 21+ acre site off Old Lower River Road at the Port of Vancouver. The property includes a large 91,100 sf Pre-Engineered Metal Building (PEMB) that receives wastefrom both self-haul customers and WCW collection trucks servicing residential and commercial accounts. This is the original transfer station structure that was constructed in 1992. Garbage or MSW is loaded into containers and transferred to barges for transportation to the Finley Buttes Landfill in Oregon. There have been no major renovations or expansions to the facility.

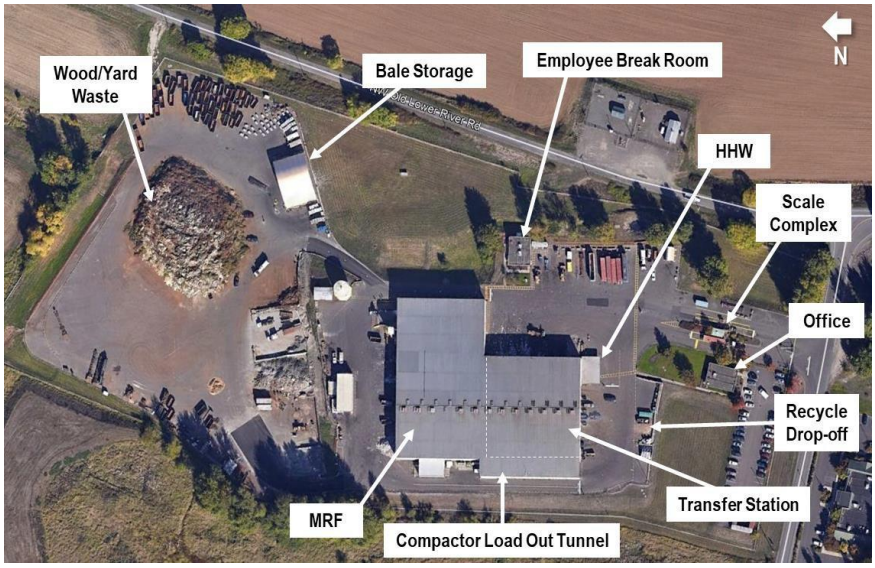
West Van also houses the equipment used to process commingled recyclable materials from residential customers and source-separated materials from commercial accounts. This is the only material recovery facility operating in Clark County and was significantly updated in 2009 when the County switched to a cart-based collection system.

In addition to these primary functions, West Van includes several other facilities necessary to provide the full range of services. This includes the following:

1. Scale house complex with inbound/outbound scales
2. Recycle drop off for self-haul customers
3. Household hazardous waste drop-off
4. Wood waste/yard debris area
5. Special waste handling such as tires/ appliances /asbestos
6. Waste oil/glass drop for collection trucks
7. Administration office
8. Employee break building

The West Van site map and the features are shown below in Figure 4.6.

Figure 4.6: Current West Van Site Plan



Over the 28 years of operation, the West Van site has added various operations to handle yard debris and wood waste, HHW, and special waste, however, the primary structure and site circulation are primarily the same as originally designed.

4.3.3 – West Van Transfer Station Operating Conditions Assessment

4.3.3.1 – Waste Quantities

The West Van MRF and Transfer Station provide several services to the Countywide system. In addition to receiving waste delivered by WCW residential and commercial collection trucks, self-haul, and private contractors the facility also is the primary recycling facility for the County. It accepts and processes commingled recyclable materials collected from residential routes and commercial accounts and it accepts wood waste and yard debris. This section of the report focuses on the operations for managing the MSW accepted at the facility. A discussion of the wood waste/yard debris and MRF operations will be discussed later in the report.

As shown in Table 4.7 below, for the four years between January 2016 and December 2019 the total amount of waste received at West Van has ranged from 97,791 TPY to a high of 110,866 TPY a difference of 13%.

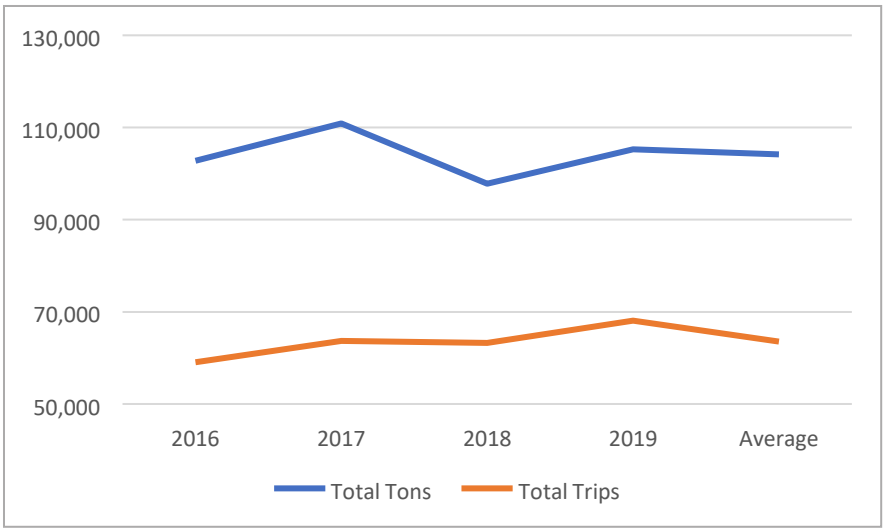
Table 4.7: West Van Tons and Trips

Tons by Year						
	2016	**2017**	**2018**	***2019***	**4 - Year Ave.**	**% Average**
Cash / Self Haul	15,683	19,732	17,694	17,841	17,738	17%
Commercial	43,564	44,380	38,335	30,361	39,160	37.5%
Route Trucks	21,172	22,955	21,838	31,495	24,365	23.4%
Drop Box	22,379	23,798	19,925	25,602	22,926	22%
Total Tons	**102,797**	**110,866**	**97,791**	**105,299**	**104,188**	**100%**
Trips by Year						
Cash / Self Haul	39,003	42,805	43,299	45,674	42,695	67.2%
Commercial	10,951	11,425	11,197	10,802	11,094	17.4%
Route Trucks	2,766	2,877	2,926	4,134	3,176	5%
Drop Box	6,340	6,569	5,809	7,465	6,546	10.3%
Total Trips	**59,060**	**63,676**	**63,231**	**68,075**	**63,511**	**100%**

However, over this same period, the average waste received at the station is 104,188 tons and remains fairly constant as seen in Graph 4.5 below.

During this same period, the average transaction or trips to the station has average 63,511 annually and has remained relatively constant.

Graph 4.5: West Van Historic Waste Quantities and Traffic



It has been reported by WCW that during the last part of 2019 the compactor at West Van was not operating at full capacity and was due to be replaced. Therefore, WCW re-directed some collection trucks to CTR to be unloaded until the new compactor was installed and operational in early 2020. In comparing the last five months of 2018 to that of 2019, it appears that about 1,000 tons per month (TPM) or 50 TPD were being re-routed. This would mean the commercial truck traffic might be seven or eight more vehicles per day. WCW is considering the current status to determine the diverted, most efficient collection and system operation.

Currently, the transfer station receives on average 2,000 tons per week with improved compactor capacity in 2020 or about 380 tons per weekday and about 100 tons on a Saturday. In Chapter 2, projections were made as to how much waste might be generated in the Cities and the County. The City of Vancouver is projected to grow by about 21,000 people by 2035. This would translate to about 17,000 tons of additional waste annually. However, according to the County's Growth Management Plan (GMP), it appears much of this growth is projected to occur in the urban growth areas located in the north-central part of the County. Depending on how much growth occurs in the West Van service area it is estimated the projected total amount of waste to be received at the transfer station could range from 9,000 tons to perhaps 22,000 tons annually when rounded. This would mean an expected increase of somewhere between 150 tons to 423 tons per week or worse case 85 tons per day. When added to the current waste quantities, West Van might expect to receive as much as 450 tons per weekday. Thus, the facility would need to be able to receive and load out perhaps 500 tons per day on peak days.

The West Van station is now equipped with a new compactor. Load times for the compactor are between 20 and 25 minutes. With each load being on average 30 tons. Therefore, the station can produce 16 loads over eight hours or 480 tons. If the station were to operate for 12 hours, it could process 720 tons. Based on these conditions, West Van can process the current and projected future waste quantities.

4.3.3.2 – West Van Traffic Conditions

The West Van facility was initially designed to accept the County's MSW and transfer the waste to containers that could be barged to the regional landfill (Finley Buttes). Unlike the other stations, West Van serves as the primary receiving facility for more waste streams including handling all of the recycled materials collected in the County. This results in more traffic from different sources that must cross the scales and travel within the site to unload. Even though the City of Vancouver provides universal collection services to all residential and commercial customers there is a fair amount of self-haul and contractor traffic.

The total traffic at West Van includes a wide range of customers. Self-haul and cash customers include cars, vans, pickups, vehicles with trailers, and independent contractors, who are directed to unload on the south side of the transfer station. Some customers also use the HHW drop-off site on the south side. Only vehicles with wood and yard waste travel on the north side to access the organics receiving area on the far north side of the facility. WCW's intercompany traffic includes MSW collection trucks from residential and commercial routes, residential collection trucks with commingled materials and yard waste, and drop box or roll-off trucks from various sources. These vehicles primarily stay on the east side of the station tounload in either the MSW bays or those bays dedicated for recycling trucks. Collection trucks with organics/food waste unloaded in bay 1 next to the compactor under the roof (See Figure 4.8 on page 4-23).

In reviewing the data for the past three years, during a peak week of August 2018, West Van received 2,169 vehicles as shown in Table 4.8. Almost 68% or 1,465 weekly trips of this traffic was self-haul, cash, or government customers. The WCW intercompany traffic was 633 for this peak week. During these periods there can be almost 400 vehicle transactions processed in a single day.

Table 4.8: West Van Peak Weak Inbound Customers –August 27 – August 31, 2018

Customer Type	***Monday***	***Tuesday***	***Wednesday***	***Thursday***	***Friday***	***Saturday***	***Total***
Self-Haul MSW	177	139	115	137	185	202	955
Wood/Yard Waste	38	33	37	40	54	62	264
Other	31	49	39	36	37	54	246
Total Self-Haul/ Cash	**246**	**221**	**191**	**213**	**277**	**312**	**1,465**
WCW MSW & C/D	59	69	41	52	57	1	269
Wood/Yard Waste	7	14	10	11	11	1	54
MRF/Recycle	63	61	67	64	50	5	310
Total Commercial	**129**	**144**	**118**	**127**	**108**	**7**	**633**
Total West Van	**388**	**384**	**323**	**352**	**397**	**325**	**2,169**

The following provides an assessment of the West Van facility and the types of traffic that CRC manages each day. The purpose is to review the functional operation and determine if the current infrastructure is sufficient to support efficient operations. The focus is not on how CRC is operating the facility or whether facilities might need to be retrofitted and/or expanded. CRC has an excellent

record of operating the facility safely to meet the needs of the regional system.

4.3.3.3 – Self Haul /Cash Customers

On an average weekday, the station receives between 180 to perhaps 230 self-haul vehicles per day. A typical week is displayed in Table 4.9. On a typical Saturday, the self-haul customer traffic is about 270 to 280 vehicles.

Table 4.9: West Van Average Weekly Inbound Customers

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
Self-Haul		189	181	180	204	281	1,264

During the peak week in August 2018, the weekday traffic averaged 230 vehicles but was as high as 297 vehicles on a Friday. The peak hour on a Saturday was 312 vehicles as shown in Table 4.10. Over 80% of self-haul traffic represents cars, vans, pickups, and vehicles with trailers. It also includes some other cash customers or perhaps small contractors, or government loads.

Table 4.10: West Van Peak Week – August 27 to August 31, 2018

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
Self-Haul	246	226	191	213	277	312	1,465

These vehicles are weighed and upon leaving the scale are directed by signs to turn left to unload on the south side of the transfer station building. Bays 1 through 5 on the south side of the building are allocated for self-haul and cash customers to unload. Assuming two vehicles can occupy one bay, the facility on weekdays, can unload 10 vehicles at any one time. Assuming an averagetime to unload is 10 minutes each stall can unload six vehicles per hour. Therefore, the total capacity for unloading self-haul or cash customers is 60 vehicles per hour during the week. As shown in the following Table 4.11 on an average weekday the station receives anywhere between 30 to as many as 40 vehicles in any one hour (highlighted in yellow in Table 4.11). Given the number of unloading stalls available on the south side, the station can effectively manage theself-haul and waste stream.

Table 4.11: West Van Average Inbound Traffic by Hour (highest hour(s) are highlighted)

Time of Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
5:00 AM	3	3	3	3	3		13
6:00 AM	15	13	13	14	12		68
7:00 AM	17	16	15	15	15	2	82
8:00 AM	24	22	21	22	22	22	133
9:00 AM	30	27	29	28	31	26	171
10:00 AM	36	34	34	33	36	35	208
11:00 AM	39	39	38	38	40	42	237
12:00 AM	40	36	37	37	39	42	233
1:00 PM	40	40	37	36	40	43	237
2:00 PM	41	37	35	36	37	43	230
3:00 PM	34	35	32	34	34	40	210
4:00 PM	25	24	25	22	25	1	123
5:00 PM	12	11	11	10	11		54
6:00 PM							1
Total:	**356**	**337**	**330**	**328**	**345**	**296**	**2,000**

The station also has six bays, each 22-foot-wide for unloading commercial vehicles on the east side of the building. On weekends when there are limited commercial trucks to unload, self-haul traffic can be directed to use one or more of these bays to unload. If the station receives 320 vehicles on a Saturday and they arrive over five hours, the peak hourly events would be 64 vehicles per hour. Using the five bays on the south side and dedicating just two bays on the east sidewould increase the capacity of the station to handle as many as 84 vehicles per hour (60 on thesouth plus 24 on the east side).

The remaining self-haul/cash customers, about 20% or 40 vehicles per weekday do travel along the east side of the transfer station building to the far north side to unload wood and yard waste. CRC directs these customers to unload in designated areas but there is adequate space to accommodate this traffic.

Inside the transfer station, there is more than sufficient space to handle all of the waste unloaded and have surge capacity for 200 tons or more. Typically, West Van receives about 150 tons per day from self-haul and cash customers.

4.3.3.4 – Commercial / WCW Traffic

The commercial or what is referred to as WCW intercompany traffic averages between 120 to 130 vehicles per day (See Table 4.11). This traffic is divided into three primary collection services.

Commercial trucks collecting waste from residences and businesses represent 42% or about 53 vehicles per day. Trucks collecting commingled recyclable materials from residences and commercial accounts is almost 50% or 62 vehicles per day. Yard waste collected from residences and businesses every other week represents about 11 vehicles per day. However, the yard waste truck traffic will drop off slightly during the winter months when there is less yard waste generated byresidences in the City of Vancouver.

All the commercial trucks with waste will travel to the east side of the transfer station and will unload in bays 6 through 9 each with 22-foot-wide doors. There could be as many as 10 to 12 trucks perhour in peak times that need to unload. Assuming a typical commercial truck unloads in seven minutesone stall can handle about eight vehicles in one hour. Four bays could if needed handle two trucks, but it is preferable to allow more space for commercial trucks to unload. However, the four bays can easily handle about 48 vehicles in a peak hour.

The recycling trucks are directed to unload in either bay 10 or 11. Whereas there are more recycle trucks arriving each day they tend to be more spread out over the eight-hour collection period. Assuming worse case perhaps 15 trucks could arrive to unload in a single hour. Each bay can manage seven to eight trucks per hour. Thus, at times there may be a short wait to unload but this wouldappear to be infrequent. And, because some of these trucks are collecting source-separated recyclable materials such as mixed paper or OCC, these trucks are directed to unload on the north side of the MRF building. Glass is collected separately and is unloaded in a bay located on the west side.

In the MRF section of this report, there is more discussion of the MRF space and operations. However, from the standpoint of having stalls to unload the current West Van station provided sufficient space.

As with the rest of Clark County, Vancouver has had a subscription curbside yard debris program service provided since 1995. Segregated yard debris has generally been delivered to a local processor such as H & H or McFarlane's. However, in April 2019 the City of Vancouver initiated a new 10-year agreement with WCW to incorporate food scraps into the subscription yard debris program available to city residents (effective September 30, 2019). The program rebranded as *Organics Collection* was modified to provide customers with options for container sizes, the availability of on-call service, and access to commercial generators.

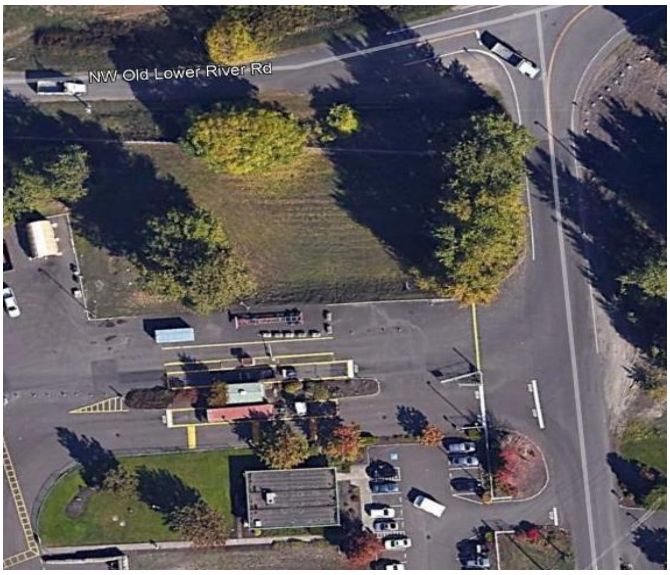
One key change to the program requires that the organic material (yard debris with food scraps) be received inside the West Van Transfer Station (in bay 1) where it is reloaded and transferred daily for processing at the Dirt Hugger facility located in Dallesport, WA. WCW has a contract with Dirt Hugger to manage the Vancouver organics through 2030. This material must be handled in an enclosed facility versus being received either at one of the local processors or unloaded on the north side of the West Van facility. The West Van operating permit allows for the current volume of combined Vancouver yard debris and food waste and some source-separated food waste delivered from schools or certain commercial restaurant/grocery locations.

There is potential in the next two to five years for other city or County curbside yard debris programs to add food scraps as an option and for increased participation by businesses/schools in separating their food wastes. Bay 1 can handle the current volume of materials, but with the expansionof the program in the City and perhaps to other parts of the County will require some expansion or reconfiguration of the capability/capacity at West Van to manage this material.

4.3.3.5 – Scale House Operations

West Van is open to receive waste six days per week and is closed on Sunday. During the week, the hours of operations are from 6:00 AM to 6:00 PM. On Saturdays, the station is open from 8:00 AM to 4:00 PM. All vehicles enter the facility by taking a left turn from NW Old Lower River Road onto a private access drive. The driveway into the West Van station is located less than 200 feet from NW Old Lower River Road which has limited public traffic and only serves a few residences and farms. Upon entering the transfer station, the scale house complex includes one inbound and one outbound scale (See Figure 4.7). There is also a bypass lane on each side of the scale house. The scale house complex is located just 100 feet from the private access road. Therefore,the total onsite queue is less than 100 feet. The inbound bypass lane does have a small booth that can be occupied to handle the traffic that may not need to be weighed if such customers using the recycle drop-off or HHW facility.

Figure 4.7: Entrance and Scale house Complex



It is assumed that transaction time to process customers is similar to the CTR or 45 seconds per cash customer. Therefore, the scale can process 1.33 customers per minute or 80 vehicles per hour. West Van only has one inbound scale therefore, both commercial collection trucks and self-haul cash customers must both use the scale. The difference is that commercial trucks have registered tare weights and with the RFID code can be processed in less than 15 seconds.

The data shows that inbound cash customers can be processed at 80 vehicles per hour. Yet on an average weekday, the traffic can be 40 vehicles per hour using about 30 minutes of weigh-in time. Over the remaining 30 minutes, the scale can process over 100 commercial trucks in that same hour if there are perhaps 30 commercial trucks in a peak hour, then the scale would manage the traffic without major delays or long queues.

With less than 100 feet of onsite queue space the facility can support maybe four to six self-haul vehicles in the queue but only three commercial trucks. Traffic may spill onto the private access road withminimal disruption to other traffic. This space would more or less double the queue space beforespilling onto NW Old Lower River Road.

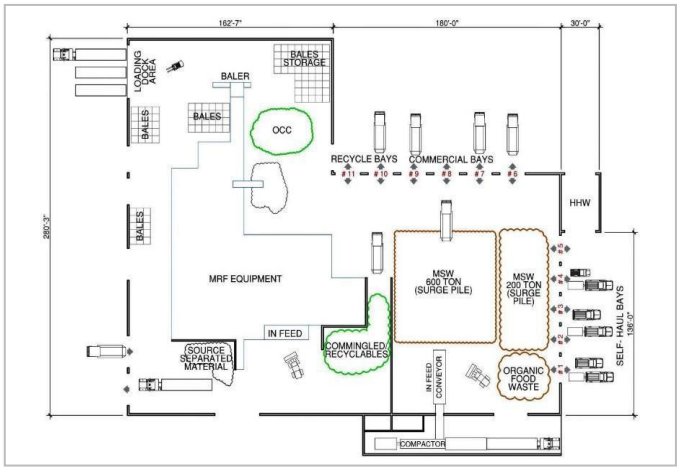
It was reported by the WCW Engineer on March 24th, that when the scales are being calibrated ormalfunction there could be short delays that can cause some vehicles to queue onto the private road. Also, there are times when traffic is heavy due to delays at the scales from large trucks maneuvering to unload. These events are very infrequent.

For the near-term conditions, the scale house complex can manage the inbound and outbound traffic without causing a queue onto the public right of way. In the future, increasedtraffic may cause off-site queueing, requiring the installation of a second inbound scale.

4.3.3.6 – Site Circulation and Tip Floor Operations

As discussed under the onsite traffic conditions the transfer station has 11, 22-foot bays that provide sufficient unloading stalls for both the self-haul and the commercial collection trucks. Figure 4.8 shows the tip floor space plan for the transfer station and MRF which is described in the following paragraphs. Also important is how traffic is managed on-site once loads have been weighed and ticketed.

Figure 4.8: West Van- Tip Floor Plan



For all self-haul/cash customers, as well as the drop-off recycle and HHW drop-off traffic, upon leaving the scale will enter the yard and approach a sign that directs them to turn left. From there, customers travel in a dedicated lane where vehicles with recyclable materials can splinteroff to use the drop-off area on the far south side of the complex. Self-haul customers with waste can proceed and are directed to unload in Bays numbered two through five on the south side of the building. There is adequate space to allow each vehicle to align with a stall in any bay and back in and unload. Once they are empty self-haul can drive back to the entrance to scale out. On weekdays they must merge with the outbound commercial traffic at this point. However, most of the commercial traffic does not have to scale out as they have registered tare weights.

Bay 1 was previously used for self-haul customers to unload but is now used to received food waste from select commercial loads. In September, the City of Vancouver allowed residences to place food scraps in with their yard waste. These loads must also be unloaded inside the transfer station in bay 1.

Vehicles that use the recycle drop-off can and do not have waste can make a U-turn and exit the facility and do not need to weigh out. When the HHW is open customers will follow this route and

can exit without being weighed out.

Once commercial trucks are weighed, they will proceed to use bays 6-11 on the east side. This includes collection trucks with recycled materials that will use bays 10 or 11. Some commercial trucks collect source-separated recyclables, and they will unload in a separate area on the north side of the building.

Trucks with yard debris and wood waste will travel to the far north side of the facility on a dedicated road to unload in the backside or far north yard. These materials are stored in a pile(s) and are routinely processed and hauled offsite to be used as hog fuel.

The total onsite traffic can range from 350 to 400 vehicle trips each day. About half of the traffic is self-haul or independent contractor while the half is WCW vehicles. Once leaving the scale complex the facility provides for other separate traffic patterns for these different operations which allow for safe and efficient vehicle circulation. The only intersection where traffic must mingle is upon leaving the site. However, the site lines are very good and with signage or with spotters when needed this traffic is easily managed.

The only travel lane shared by self-haul and commercial trucks is the route to unload at the wood/yard waste yard on the north side of the site. However, this traffic is well managed by spotters and signs.

Regarding tip floor space and the ability of the building to handle the daily waste flow, the transfer station has sufficient capacity. On the self-haul side, there are adequate unloading stalls with space to handle 200 tons or more of surge capacity. On average self-haul and cash customers will unload about 150 tons per day. On Saturdays, the tonnage is less and averages about 120 tons.

On the commercial side, WCW trucks will unload between 300 and 400 TPD. This will vary depending on the amount of drop box traffic. Based on the available space the surge capacity on the tip floor is at least 600 tons. This includes allowing space for trucks to unload, and for front loaders to operate and load the compactor. Because the tip floor provides for self-haul and commercial trucks to unload in separate areas there is little or no conflict for operators to move materials.

All MSW is pushed by front loaders onto an in-ground conveyor that discharges into a single compactor to load containers. The containers are then transported to the barge dock less than a half-mile from the station. This is a new compactor and has an operational life expectancy of 10 to 15 years assuming regular maintenance is performed.

4.3.3.7 – Yard Waste and Organics

A primary element of the regional system is having the infrastructure to manage wood and yard debris. The West Van station provides a dedicated area on the far north side of the facility. This area represents about 3.5 acres of open space that is paved. About 1.5 acres is used for customers and commercial trucks to unload wood and yard waste. Regularly, CRC's contractor will arrive on-site to grind wood and some clean ward waste to be used as hog fuel. Yard waste is ground up and sent off-site to be composted. This operation is a key component ofthe County recycling services. The remaining paved area on the north side is used to store drop box containers and other equipment. A temporary tent structure is also used as supplemental storage of recycled bales produced at the MRF. These operations are for the most part isolated from daily traffic.

There are collection routes that pick up food waste and yard waste. These trucks must unload in bay 1 where commercial food waste loads are received.Currently, there are 10 to 20 tons per day of commercial food waste unloads each day. The spacerequired to handle this amount of food waste is limited and CRC can store these materials until the time they can be loaded in a trailer for transport to Dirt Huggers for composting. There are nocompost sites in Clark County that can accept food waste. However, the City has now started a program whereby residents can place food waste in with yard waste. This service is on a subscription basis and therefore does not generate much material to date. For example, the City generates about 1,200 tons of yard waste per month or about 60 TPD. If 50% of residences participate in the food scraps plus yard waste program, the number of organics to bereceived in bay 1 would increase from 20 TPD to perhaps as much as 80 to 100 tons. This material must be received and reloaded for processing offsite, and more space will be needed. Additionally, this program's yard waste plus food scraps programs are expected to extend to other jurisdictions and may eventually be offered Countywide. Therefore, the transfer station system must provide adequate space to receive and manage this material in a covered area.

4.3.4 – Review of West Van Conditions Assessment

Our limited structural and site improvement conditions assessment reveals that most of the assets at the site are in good condition. Areas of pavement are in fair condition.

- The transfer station and MRF process building are both in **fair** condition. Many columns in the public unloading and commercial unloading areas were damaged. The column damages are considered structural and should be repaired. A schedule should be prepared to have these repaired within the next 12 months. Siding near the public and commercial unloading bays is damaged. The damage is not structural in nature and is not critical. However, the damaged siding should be repaired to prevent any potential corrosion problems due to moisture penetration.
- The scale house and scales, recycling shelter, pump house, and used oil storage facility are in **good** overall condition. No short-term action is needed.
- The administrative building, employee facility, and maintenance building are in **fair** overall condition. No short-term action is needed.
- The upper yard and lower yard areas are paved with asphalt concrete pavement. In general, the paving is in **fair** condition except for in heavy traffic areas, which are in **poor** condition. We recommend the worn surface areas be repaired or replaced to prevent extensive damage to the subgrade.
- The stormwater facilities are in overall **good** condition. No short-term action is needed.
- There is no sanitary sewer serving this facility. Offices and conditions spaces are serviced by a septic system. Drainage and washdown water in the transfer station and MRF are collected in sumps and pumped to a storage tank. When tanks are full, wastewater is transported to the Wastewater Treatment Plant.

Our structural and civil conditions assessments were limited to those areas that are readily accessible and visible to field staff. Concealed conditions that become exposed in the future may change our current recommendations.

4.3.5 – Summary of West Van Transfer Station Operations

The West Van Transfer Station was the second facility built to begin receiving waste and reloading

it into containers for transportation to the Finley Buttes Regional Landfill. Considering the 28 years of operational wear and tear it is in good condition. The layout of the buildings and support structuresare situated in a manner to accommodate the ever-changing needs of the solid waste system. CRC has been able to adapt the facility to address these needs while preserving the safety and operational efficiencies inherent in the original design.

Given the site is located on 21 plus acres, West Van provides a valuable asset for managing variouswaste streams, recycled materials, and organics. There are no immediate improvements requiredto enhance current transfer operations. In the future with added traffic, there may be a need to increase capacity at the scale house by adding a second inbound scale or a dedicated scale for commercial collection trucks. This is something that can be monitored and there is adequate space to increase the capacity.

Physical improvements that have been identified in the “Conditions Assessment” report will need to be planned for in the six-year capital improvement plans.

One consideration would be to consider developing a long-term master site plan. This plan would be prepared in conjunction with the evaluation of the infrastructural needs identified from updating the long-term Solid Waste Management Plan. A few examples of this are as follows:

1. One system option may be to construct a new MRF to be located in a central locationto both collection routes and provide transportation access to regional markets. One option could be to convert CTR to a MRF if the County decided to build a new transferstation at a new location.
2. If the MRF is relocated, it will free up a large building that could be repurposed for other service needs. One concept could be to provide a construction/demolition recycling facility.
3. Bay 1 has limited space and therefore additional space inside the transfer station will be needed to receive mixed organics (i.e., food waste and yard waste with food scraps)as these programs are expanded. There may be space available assuming the MRF processing equipment is relocated. Another option would be to construct a separate receiving building that can receive and process materials to be transported offsite. The operation could also be co-located with the yard waste grinding operation.

A master plan can be prepared to consider how these facilities can be implemented with the caveat they may not be built.

4.3.6 – West Van Recycling (Materials Recovery Facility /MRF) Conditions Assessment

Providing recycling services to residences and business is a primary responsibility of cities and the County. All the contracted recycled materials collected in the County are processed at the West Van MRF. A detailed review of the MRF equipment system was conducted by the consultant team. This report is included in Appendix E. This section provides a summary of this report and presents the findings.

The initial recycling processing equipment was installed in 1992. This equipment line was a basic straight-line system with presorting stations, screens, and a series of manual sorting stations to remove recyclables. The process line was significantly upgraded in 2009 with more advanced screening systems, additional sort stations, and other unit processes to improve throughput and product quality.

The current MRF system processes about 60,000 tons annually. As shown in Table 4.12 almost

70% of the material processed is commingled single-stream materials collected from residential customers. Commercial customers that largely generate source-separated materials represent about 26% with the remaining materials being generated by self-haul customers at recycling drop-off sites.

Table 4.12: West Van Total Inbound Recycle Tons by Source

Recycle Stream	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
Commercial Recycling	3,052	3,134	3,166	3,359	3,108	251	16,069
Residential Single Stream w/o Glass	8,246	7,917	8,305	7,941	7,791	711	40,911
Cardboard (WCI and Self-Haul	378	384	576	765	346	36	2,484
Total Inbound Recycling Tons	11,675	11,435	12,046	12,064	11,245	998	59,464

Table 4.13 shows the typical amount of materials received at the MRF each day. The amount of recycled materials is fairly constant during the weekdays and averages about 230 TPD.

Table 4.13: West Van Average Weekly Inbound Tons

RecycleStream	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
Commercial Recycling	59	60	61	65	60	5	309
Residential Single Stream	159	152	160	153	150	14	787
Cardboard (WCW and Self Haul	/	7	11	15	7	1	48
Total Inbound Recycling Tons	225	219	232	233	217	20	1,144

Based on current collection information more than 85% of households in the Cities and Urban Growth Boundary areas do subscribe to recycling collection services. Having this much participation in the system signals that any increase in the quantities will largely be generated by anincrease in households or potentially with new programs to collect more recyclables from either multi-family and/or commercial customers. The average daily traffic for vehicles unloading at the MRF is shown in Table 4.14 on the next page.

Table 4.14: West Van Average Weekly Inbound Traffic

Recycle Stream	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	GrandTotal
Commercial Recycling	13	13	13	14	13	1	67
Residential Single Stream	42	44	47	44	41	3	221
Cardboard (WCW and Self-Haul)	6	4	6	6	4	1	27
Total Inbound Recycle Trucks	**61**	**61**	**66**	**64**	**58**	**5**	**315**

As discussed in the previous section, most of the residential curbside collection trucks will unload in Bays 10 and 11 on the east side of the transfer station. Commercial trucks that collect source-separated materials such as cardboard from businesses will unload on the north side as these materials do not need to be processed over the full processing system. This stream of material is graded upon arrival and separated into two groups. Group one requires partial system processing on a second shift. Group two requires only floor sort quality control. This group of materials, after limited QC efforts, are conveyed directly to the balers to be processed.

Over the past 20 years, CRC has adapted the equipment needed to process the recycled materials with the existing physical structures and available space to manage these materials as needed. In reviewing the daily operations there is adequate space to receive the materials and to store them for processing. The tip floor space allocated is not ideal for unloading but CRC has created dedicated areas to avoid contamination with MSW stored in Bays 6 through 9. Also, they have created areas where source-separated materials can be unloaded in locations to provide accessto the conveyors to feed balers directly.

The current processing system that was installed in 2009 was configured to fit with the structures without major expansions. As such the conveyor system includes a number of 90 degree turns that are less than ideal when processing recyclable materials. Because of this configuration, there are obvious material flow issues that challenge yield opportunities for downstream sorters and creates more opportunities for spillage that can increase maintenance and some losses of material at conveyor transitions. These conditions are a result of the equipment being designed to fit the space provided and as acknowledged in the Condition Assessment, CRC does a good job in keeping this system operating with an up-time performance level of over 90%.

The MRF residential single stream (excluding glass) processing system is currently operating at a throughput rate of between 18 to 20 tons per run hour. The original design throughput of the system was higher perhaps as much as 30 tons per run hour. The reduction in original equipment manufacturer (OEM) run rates is due to the dramatic change in quality standards related to all paper products. This has forced the operating team to reduce the system run rate by 30% similar to many MRFs in the country that operate with equipment installed during this same period. Thus, to process the current inbound recycling streams the plant is operating between 13-16 hours per day or two shifts. Shift one processes residential single stream (3,410 per month) at 20 TPH in eight hours over an average of 22 days per month. During shift one, any commercial direct bale

materialsreceived are processed in real-time. Shift two processes the Commercial stream that requires partialsystem processing and completes baling of “direct bale” materials (like cardboard). Each shift is eight hours with one hour for breaks. The processing time does allow for process interruptions typical inrecycling process systems.

Since this system was installed there have been significant advances in equipment for processing recycled materials. Also, over the past three years, there have been significant disruptions to the markets due to the China Sword and general export market contractions. These market conditions have forced many MRF operators to consider retrofits to modernize their systems. These demands are occurring at the same time they are experiencing disruptions in the marketplace. And, because China has stopped purchasing many materials, there is an oversupply in the US market driving prices down. As an example, the average blended value for recycled commodities was peaking at about $160 to as much as $180 per ton in 2015. At the time that this assessment was completed in early 2020, the average blended value ranged from $20 to $50 per ton depending on proximity to markets. Such market values have increased significantly in 2021.

The conditions assessment provided a report to CRC that details several suggested improvements mostly related to adding certain equipment to enhance the process line flow and yield/recovery capabilities. However, longer-term it will be necessary to purchase a new system that will result in decreased labor per ton, increase throughput per hour, and improve quality and quantity of materials recovered. In the short-term, modest equipment and sorter process investments can be made that will derive immediate improvements to operational results. This equipment and sorter processes can later be incorporated into the new processing system design.

4.3.7 – Recommendations from the Operations MRF and Conditions Assessment Report

1. Expand floor grading practices. Reduce processing materials over the entire system.
2. Improve color coding/sorting signs to increase sorter awareness of priority sorts.
3. Potential Equipment Improvements:
    a. Add optical sorters on the plastics line to increase yield and decrease residue.
    b. Install robotics to select locations to improve quality and reduce labor.
    c. Replace vibratory screens with ballistics screens to improve material flow and relatedrecovery.
    d. Enhance eddy current separator
    e. Install large drum feeder to reduce surging and improve material flow and relatedrecovery.
    f. Add paper optical sorter to increase paper quality and decrease labor cost per ton.
4. As stated in the report there are several immediate benefits that could be realized with these improvements including, increase throughput/production by 5 to 10 TPH. This increase in throughput willhelp reduce overall cost but also increase plant capacity. A normal plant requires 6-8,000 tons to be cost-effective and tipping fee friendly.
5. Reduce the sorting labor cost associated with the current system. By introducing optical sorting along with robotics at certain locations fewer sorters are needed thus reducing cost. Both optical and robotic sorting typically increases sorting rates on average by 30 to 50% per position.

6. Enhance the quality of the commodities i.e., producing bales with less contamination and generating higher valuations. CRC is producing clean bales and is successful in marketing all materials. But there is a lost opportunity to compete in high-grade markets thatrequire better than current state quality. Thus, the ability to produce premium high-qualitybales should help this MRF stay at the forefront of market opportunities.

The full MRF Conditions Assessment is provided in Appendix E.

4.4 Washougal Transfer Station Operations and Conditions Assessment

4.4.1 – Background

The Washougal Transfer Station serves the eastern portion of Clark County, including the cities of Camas and Washougal. This section provides a description of the facility and an assessment of both the operating and site conditions. The results will be used to identify any necessary capital improvements that are needed to enhance immediate services as well as determine investments to satisfy longer-term services for this area.

4.4.2 – Washougal Transfer Station Description

The Washougal Transfer Station began operations in 2009. The facility is located on a 4.6-acre site in the Port of Washougal. Customers enter from Grant Street to a scale house complex that includes one inbound scale and one outbound scale. Each customer must be weighed, and fees are assessed based on total waste disposed of. It includes a 75-by-60-foot transfer station building (4,500 sf) with a depressed tunnel for loading transfer trucks and trailers. The station operates as a lift-and-load, meaning the bottom of the tunnel is only eight feet below the tipping floor. Therefore, a front loader is used to lift waste about nine feet to load trailers.

The transfer station has three 22-foot-wide access doors where self-haul vehicles can back in and unload. This design allows for up to six vehicles to unload at one time. The layout of the facility is shown in Figure 4.9.

Figure 4.9: Current Washougal Site Plan

On the south side of the station, a 22-foot roll-up door allows access for commercial collection trucks to back in and unload onto the tipping floor. The facility is open six days per week (Monday–Saturday) for commercial collection trucks from 7 a.m. to 5 p.m. The transfer station is open to the public and self-haul traffic on Wednesdays and Fridays from 7 a.m. to 5 p.m., and Saturdays from 8 a.m. to 4 p.m.

The facility also provides a recycling drop-off center where customers can bring commingled and source-separated materials to be recycled. The drop-off center is open to the public Monday through Friday from 7 a.m. to 5 p.m. and Saturdays from 8 a.m. to 4 p.m. Customers can drop off household hazardous waste (HHW) every third Saturday of the month from 8 a.m. to 4 p.m.

4.4.3 – Washougal Operating Conditions Assessment

The assessment of the transfer station operations was made on Wednesday, February 12, 2020. The site visit included a meeting with the site manager and a review of current conditions. This operations review focused on how the site manages traffic and waste handling and loading under the present conditions. The assessment will consider how the current facilities can manage future waste volumes and traffic to service the eastern portion of the County. During this same visit, a physical condition assessment was made by structural and civil engineers. A full report of the physical site conditions is presented in Appendix D.

4.4.3.1 – Washougal Waste Quantities

Over the past three years, the amount of waste received at the transfer station increased about 10% from 25,468 tons in 2017 to 27,784 tons in 2018. In 2019 the facility received 32,031 tons or a 16% increase from 2018. This increase can be attributed to growth but also an increase in self-haul customers. The majority of waste is received on weekdays from commercial waste haulers. This includes the City of Camas, who is responsible for collecting waste in the City, and from WCW, who collects waste from the City of Washougal and the unincorporated portions of eastern Clark County. The facility is open to receive waste from self-haul customers three days per week (Wednesday,Friday, and Saturday). The station is not open on Sunday.

Tables 4.15 and 4.16 show the amount of waste delivered by different serviceproviders and self-haul customers in 2018 and 2019, respectively.

Table 4.15: Washougal Transfer Station Annual Inbound Tons 2018

CustomerType	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	GrandTotal
Self-Haul /Cash Customers	0.15	3.90	1,940.10	10.81	650.04	2,184.32	4,789.32
City of Camas	1,098.68	1,565.37	1,976.82	1,366.80	1,414.54	0.93	7,423.14
WCW	4,654.02	3,223.36	4,179.98	3,156.34	4,339.81	91.35	19,644.86
Recycling	3.17	5.80	17.72	8.84	2.56	6.50	44.59
Other	0.07		21.61		5.22		26.90
Total Tons	**5,756.09**	**4,798.43**	**8,136.23**	**4,542.79**	**6,412.17**	**2,283.10**	**31,928.81**

Table 4.16: Washougal Transfer Station Annual Inbound Tons 2019 (January–July–31 weeks)

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
Self-Haul /Cash	0.88	11.81	1,276.67	17.59	664.13	1,325.14	3,296.22
City of Camas	763.00	856.52	1,054.26	837.86	874.29	0.56	4,386.49
WCW	2,517.25	1,618.36	2,202.29	1,738.96	2,488.90	15.98	10,581.74
Recycle				5.78	3.22	1.59	10.59
Other			103.30		33.86	0.07	137.23
Total (31 weeks)	3,281.13	2,486.69	4,636.52	2,600.19	4,064.40	1,343.34	18,412.27
Estimated 2019 Total	**5,503.80**	**4,171.2**	**7,534.3**	**4,361.6**	**6,817.7**	**2,253.3**	**30,885.1**

From 2018 to the seven months of 2019, there is an increase in waste delivered by self-haul, from 15% to 18%. The City of Camas increased slightly, by 1%, from 23% to 24%. The waste collected by WCW in the City of Washougal and the incorporated County decreased from 62% to 58%. However, total waste has not increased.

Considering the same time frame the data (shown in Table 4.17 and Table 4.18 on the next page) show the average daily waste volume delivered can vary from as low as 8 TPD to as muchas 155 TPD. The peak waste volume is delivered on Wednesdays, one of three days per week that the transfer station is open to self-haul customers.

Table 4.17: Average Daily Inbound Tons 2018

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Self-Haul/Cash	0	0	37	0	13	42
City of Camas	21	30	38	26	27	0
WCW	88	62	80	61	83	2
Recycle	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total Tons	**109**	**92**	**155**	**87**	**123**	**44**

Table 4.18: Average Daily Inbound Tons 2019

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Self-Haul	0	0	40	1	21	43
City of Camas	25	28	33	27	28	0
WCW	81	52	69	56	80	1
Recycle	0	0	0	0	0	0
Other	0	0	3	0	1	0
Total tons	**106**	**80**	**145**	**84**	**130**	**44**

The lowest volume of waste received is 44 tons on Saturdays, when only a few commercial collection trucks are operating. This represents about 7% of the 600 tons total waste received during a typical week.

4.4.3.2 – Waste Projections

The population of the cities of Camas and Washougal is projected to increase from 39,790 to 56,445, an increase of almost 17,000 people, by 2035. The amount of growth in the unincorporated areas in the eastern part of the County is more difficult to project. Based on assumptions made in the waste projections it is estimated that 11,000 more people could live in the unincorporated portions of eastern Clark County. In total, 28,000 additional people are projected to be served by the Washougal Transfer Station.

With this growth, the increase in waste will be about 23,000 TPY. When added tothe current waste volume of 32,000 TPY, the projected total waste is estimated to be about 55,000TPY. This estimate suggests the amount of waste received at the Washougal Transfer Station will increase to about 1,060 tons per week. With only 7% delivered on Saturdays, the weekday volume could be between 970 tons to perhaps 1,000 tons. Although weekday volumes could average 200 TPD, if Wednesdays remain open to self-haul, the amount of waste received on thatday could be as much as 250 tons.

4.4.4 – Circulation and Traffic Conditions

The overall circulation of customer traffic is in a counterclockwise direction, which is the most desirable. All customers enter through a single access point and are weighed on a single scale. Commercial collection trucks from the City of Camas and WCW can back in the large door on the south side of the station to unload. On Mondays, Tuesdays, and Thursdays, when there are no self-haul customers, these collection trucks can also use the doors on the west side of the station. After unloading, collection trucks that have an established tare weight can exit without crossing the outbound scale.

On days when self-haul customers use the station, they enter through the same gate and weigh in. They can then proceed to one of three open doors, each of which has two stalls to unload waste. After unloading, vehicles return to the outbound scale to determine the fee.

This circulation provides some separation of self-haul customers and commercial to unload, but they must intersect upon entering and leaving the site.

Some self-haul customers will bring in special waste, such as appliances, bulky items, or tires. These are unloaded and stored under a canopy on the north side of the transfer station building. These customers must then maneuver past the traffic waiting to unload at the transfer station to return to the outbound lane at the scale complex.

4.4.4.1 – Traffic Volumes

Waste is received at the transfer station six days per week, but self-haul customers only deliver waste on Wednesdays, Fridays, and Saturdays. In 2018, 26,507 trips were made to the station, with 77% of those trips made by self-haul customers. As shown in Table 4.19, most trips are made on Saturdays and Wednesdays; far fewer are made on Fridays.

Table 4.19: Washougal Transfer Station Annual Traffic, 2018

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
Self-Haul/ Cash	2	3	7,468	9	2,197	10,819	20,494
City of Camas	171	230	264	196	202	7	1,070
WCW	1,016	885	919	911	1,147	11	4,889
Recycle	1	2	6	3	1	18	31
Other	1		13		5		19
Total Traffic	**1,191**	**1,120**	**8,670**	**1,119**	**3,552**	**10,855**	**26,507**

Peak traffic weeks from August 2018 and July 2019 are shown in Tables 4.20 and 4.21. They show that peak traffic customers decreased from 208 to 244 on Saturdays. Traffic on both Wednesdays and Fridays also decreased.

Table 4.20: Washougal Peak Traffic Week, August 2018

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Self-Haul/Cash	0	1	197	0	108	244
City of Camas	5	4	4	4	4	0
WCW	21	17	18	15	22	0
Total Traffic	**26**	**22**	**219**	**19**	**134**	**244**

Table 4.21: Washougal Peak Traffic Week, July 2019

Customer Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Self-Haul/Cash	0	0	144	0	42	208
City of Camas	3	4	5	4	4	0
WCW	19	17	18	18	22	0
Total Traffic	**22**	**21**	**167**	**22**	**68**	**208**

Table 4.22 shows the average hourly self-haul traffic over the three-year period from 2017 to 2019. As shown, the transfer station was open for self-haul customers for only two days, Wednesdays, and Saturdays, in 2017. The station opened for self-haul on Fridays beginning in 2018. Although the total number of self-haul trips has increased slightly over this period by adding an extra day, the peak hourly traffic of about 30 vehicles has remained relativelyconstant.

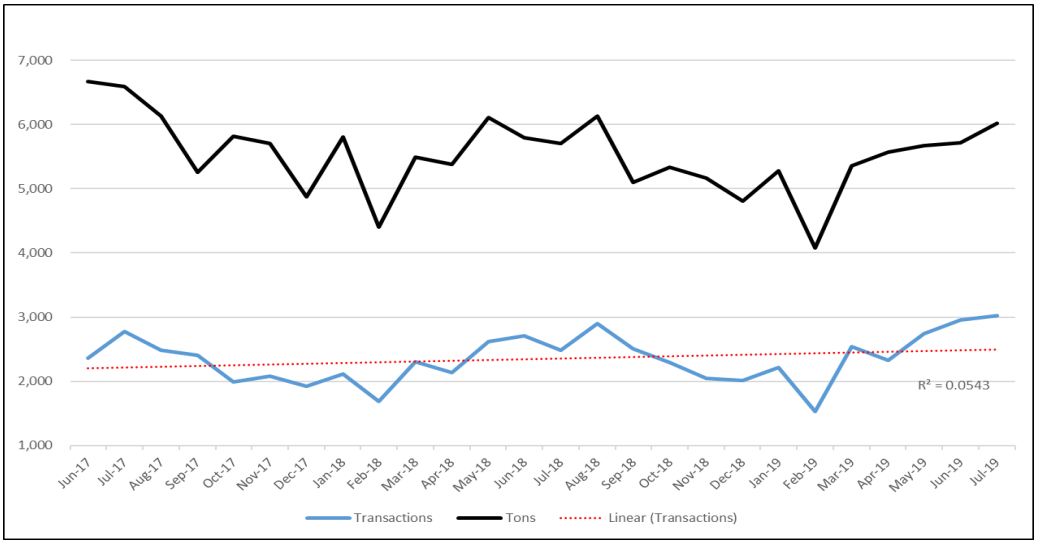
Table 4.22: Washougal Average Incoming Self-Haul Traffic by Year

Year	2017		2018			2019		
Time	Wednesday	Saturday	Wednesday	Friday	Saturday	Wednesday	Friday	Saturday
6:00	1	0	0	0	0	1	0	0
7:00	6	0	5	2	0	6	3	0
8:00	11	20	10	3	20	11	6	16
9:00	17	25	16	4	25	17	8	21
10:00	20	29	18	6	29	19	9	27
11:00	21	32	17	6	32	19	10	31
12:00	19	29	17	5	29	16	9	29
13:00	17	29	17	5	29	16	9	31
14:00	18	26	16	4	26	17	8	28
15:00	16	26	16	5	26	14	8	30
16:00	14	1	12	3	1	13	6	1
17:00	0	0	0	0	0	0	0	0
Total	**160**	**217**	**144**	**43**	**217**	**149**	**76**	**214**

The transfer station has three large doors that allow up to six vehicles to unload at once. Assuming the average time to unload a self-haul vehicle is 10 minutes each, an unloading stall can handle six customers per hour. Therefore, the station has a capacity to unload 36 vehicles per hour.

While total waste volumes have remained fairly constant over the past three years, the total number of transactions at the Washougal Transfer Station has increased. Graph 4.6 on the next page shows the relationship of waste volumes, shown in black, to total transactions, shown in blue, over the past two years. The red dashed line displays the linear trend in the number of customers over this period. Although the trend line shows a gradual increase in traffic, with the expected growth in population for this area, the population growth can be 28,000 more people by 2035.

Graph 4.6: Washougal Transfer Station Inbound Traffic and Tons



As discussed previously the amount of waste received at the transfer station may increase by over 50% in the next 15 years.

4.4.4.2 – Operations

During the site visit, the site manager for CRC reported the facility has no significant operating deficiencies. At times, traffic can back up to the street, but it is not a routine condition. However, this is based on the number of customers and waste volumes having remained similar in the past few years. With moderate growth in customer traffic on Wednesdays and Saturdays, additional unloading stalls would be needed.

The station is receiving an average of 30 customers per hour over a six-hour period on Wednesdays and Saturdays. With only 12 stalls for unloading, the facility is near capacity to handle the self-haul traffic. One option to increase capacity might be to open another day each week, perhaps on Sundays. As shown in Table 4.22, customer traffic on Wednesdays declined when the station opened on Fridays in 2018. Between 2018 and 2019 the traffic on Saturday remained constant, with traffic increasing on Fridays.

The other option would be to plan to expand the transfer station building to provide more stalls.

Eventually, as traffic increases, the station may need to widen the entrance road and expand the scale house complex to provide an additional inbound scale. This is not an immediate need, but a longer-term improvement that should be planned. The current site appears to provide the space needed to make this improvement without any additional property.

4.4.4.3 – Surge Capacity

It was reported that commercial trucks will unload using the south door. Waste can then be pushed and lifted to dump into trailers on the east side of the building. Because the building is only 60 feet wide with only 45 feet available for storage of waste at certain times, some waste can spill out of the building temporarily. This is not a routine event but is an indication of the limited surge or storage capacity of the station. On days when self-haul customers are unloading there could be interruptions from unloading until the waste is clear from the tipping floor to allow self-haul access to certain stalls.

One approach to increase the surge capacity is to construct a push wall along the wall of the transfer station where trailers are loaded. This wall would be approximately 10 feet high to allow waste to be stacked and provide more space for waste to be unloaded. The push wall would also provide a load chute and would protect the sidewalls of the trailer from potential damage as waste is lifted to load the trailer.

These conditions also suggest the transfer station should be expanded to increase both the surge capacity for waste and to add stalls for self-haul customers.

By adding a new 4,500 sf building adjacent to the existing transfer station, the numberof unloading stalls can be doubled to 12, allowing for as many as 70 vehicles per hour. This addition would also provide more surge capacity for waste volumes.

4.4.4.4 – Recycling / HHW Operations

The recycling and HHW drop-off areas are accessible from Grant Street, even when the station is closed to self-haul customers. The overall space is sufficient for managing the recycling needs of the community. Likewise, the HHW facilities are sufficient for managing materials dropped off. The only drawback is that when the HHW is open, traffic can back up and temporarily impede access to the recycling drop-off area. Fortunately, the HHW facility was designed to allow for two drive-through lanes for customers. To provide access to both lanes and eliminate interference with access to the recycling center, the entrance lane to the HHW can be widened. According to the operator, this would resolve the recycling center access problem.

4.4.5 – Conditions Assessment

Our limited structural and site improvement conditions assessment reveals most of the assets at the site are in good condition except areas of pavement, which are in fair condition.

- The transfer station is in **good** condition. Siding damage behind the trailer lift-and-load area was observed. The damage is not structural in nature. However, the damaged siding should be repaired to prevent potential corrosion problems due to moisture penetration.
- The HHW canopy, the scale house, and administration office are in **good** overall condition. No short-term action is needed.
- The gravel storage area is in **good** condition. No short-term action is needed.

- The public recycling area is in **good** condition. Small areas of cracked pavement were observed. No short-term action is needed. The cracked pavement should be repaired in the future.
- The drive aisles that course through the site are paved with asphalt concrete pavement. In general, the paving is in **good** condition except for in the truck maneuvering areas. We recommend the worn surface areas be repaired or replaced.
- The storm facilities, the sanitary system, and the water system are in overall **good** condition. No short-term action is needed.

Our structural and civil conditions assessments were limited to those areas that are readily accessible and visible to field staff. Concealed conditions that become exposed in the future may change our current recommendations made here. The Conditions Assessment Report is included in Appendix D.

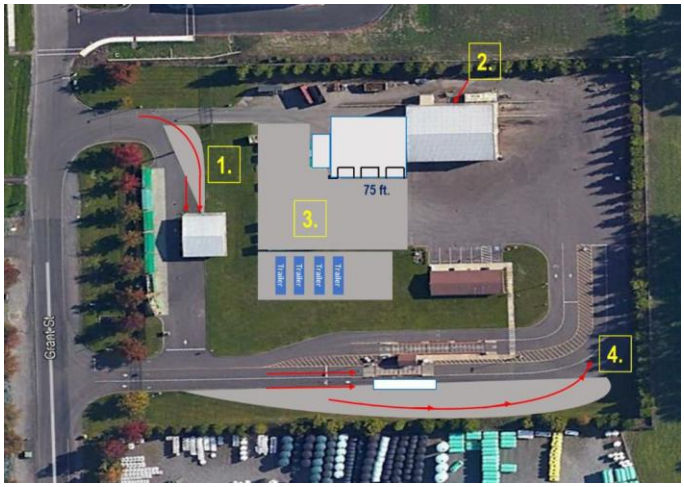
4.4.6 – Summary of Washougal Operations and Conditions Assessment

The Washougal Transfer Station is currently operating close to its capacity but with no critical operating deficiencies. The County may consider opening the station for self-haul customers for additional days of the week. Assuming this would result mainly in distributing the currentcustomers over a longer period, not increasing overall transactions, this may resolve any near-term needs to add more stalls. This is similar to what occurred when the CRC opened the stationto self-haul customers on Fridays in 2018.

The only other minor improvement to consider would be to add a push wall to stack waste along thetrailer tunnel. This could provide additional stacking for waste prior to loading and reduce spillagewhen loading trailers.

To address the overall needs of the facility to meet the needs of the service area, there are several improvements that should be planned to provide more unloading stalls and to add tipping floor space. This site map in Figure 4.10 below shows four improvements to be included in the Capital Improvements Plan for the Washougal Transfer Station.

Figure 4.10: Site Map Showing Improvements



1. A short-term improvement mentioned by the operator was to expand the access lane to the HHW facility. This is a minor investment to improve traffic flow and safety and could be completed in the near future.
2. Add a steel backsplash and chute along the east side of the building in the load-out tunnel. This backsplash will protect the siding from damage caused from loading trailers. It should also reduce possible spillage of waste from the top-load operation. Also, consider adding a short push wall on the tip floor side to increase surge capacity.
3. Expand the transfer station building and pave the yard to increase capacity. The new building can include a lean-to on the north side to provide storage of special waste.
4. Expand the entrance road to increase the capacity of the scale complex and reduce the potential of traffic backing onto Grant Street.

With the expected growth in the service area to increase waste volumes at the facility by as much as 50% in the next 15 years, these improvements can be scheduled over the next three to six years.

Chapter 5

North Area Service Options

5.1 Introduction

This Chapter describes the options for providing the transfer and recycling facilities needed to serve the north and central portion of Clark County. This area is currently served by CTR. As described in Chapter 2, the north-central portions of the County are projected to experience the largest percentage of growth over the next 15 years. This growth has resulted in increased waste volumes and traffic at CTR and the need to make investments in facilities to manage the current conditions. However, to manage future growth in this service area additional investmentsin the system will be necessary. This chapter of the report details the options for meeting the future infrastructure needs of the northcentral service area as identified in the CTR assessment report discussed in Chapter 4.

The three distinct options identified are summarized as follows:

1. Make major Improvements at CTR to address current and future service needs
2. Make minimal improvements at CTR and site and build a new satellite transfer station to serve the northernmost portion of the County and relieve some of the customer traffic using CTR.
3. Replace CTR with a new transfer station designed to handle future growth. This alternative recognizes the need to minimize impacts to the residential properties adjacent to CTR; it is important that CTR be a good neighbor.

For each option, the consultant team has developed conceptual facility plans to be used to provide planning level construction cost estimates. The cost estimates are used to complete an evaluation of the financial impacts to the regional system in order to compare the options. They are also used to prepare a 20-year capital improvement plan (CIP) for the regional system.

5.2 North Service Area Facility Information

The facility needs for serving the north-central portion of the County were discussed earlier in Chapters 2 and 4 of the Study. The following represents a summary of the key criteria for making these future investments.

5.2.1 – Waste Quantities

Currently, CTR handles about 230,000 TPY of municipal solid waste and averagesbetween 800 to 900 TPD) on a typical weekday. During peak months, CTR receives1,000 tons or more per day. Approximately 90% of weekday waste is received from WCW collection trucks with 10% being received from self-haul vehicles. Based on the CTR assessmentreport, the current facility is at capacity with limited space to store material as well as limited capacity to load out materials under current operating hours. CTR is also currently deficient in thespace needed for self-haul customers to unload. This problem is exacerbated on weekends

when as many as 900 vehicles use the facility on a typical weekend day between April and October. The transfer station was expanded in 1992 when the Leichner Landfill was closed and there have been no major investments or expansions since.

Population projections made by OFM show that Clark County is expected to grow by 132,000 people by 2035. Using information from the Growth Management Plan (GMP) most of the growth will occur in the north-central portion of the County.This includes the UGB areas in the central county area as well as the northern cities of Battleground, Ridgefield, and La Center. It is difficult to predict how much growth will occur insideor outside the UGB and therefore, how much future waste will be generated and collected, and delivered to CTR. Conservatively, however, it may be as much as 75% of this growth would be served by the CTR due to its proximity and access by the most populated portion of the County. Table 5.1 uses the population projections to estimate the amount of additional waste that could be received at CTR over the next 15 years.

Table 5.1: Estimated Growth CTR Service Area (2035)

Growth Assumptions	**Added Population**	**Additional Waste at CTR *(1,614 lbs./person/ yr.)***
50% UGB Growth in CTR Service Area*	77,642	62,657 TPY
75% UGB Growth in CTR Service Area*	92,839	74,921 TPY

* Remaining population growth is expected to occur within the current City limits of Vancouver and in the eastern portion of the County including Camas and Washougal.

Using these growth projections, CTR could receive between 62,000 to as much as 75,000 additional TPY. For planning purposes, it is assumed that 75,000 TPY will be added to the already 230,000 TPY. The result is an additional 1,442 tons per week or 288 TPD (over 5 days). To account for peak periods, it would be safe to assume as much as 300 additional tons per daywill be received at CTR, thus bringing the total waste to 1,300 TPD or an increase of 30%.

Table 5.2: Waste Projections

Item	**Tons Per Year**	**Estimated Peak Tons Per Day**
CTR (2019)	230,000	1,000
Expected Increase	75,000	300
Total Tonnage	**305,000**	**1,300**

5.2.2 – Customer Traffic

Provided there are no major changes to the collection policies and practices serving the northern cities and the urbanized area of unincorporated county it can be assumed the customer traffic using the transfer station system will also increase by 30%. During the non-peak periods between November and March, CTR receives on average 524 self-haul and cash customers. On

weekends, almost 600 vehicles arrive at the facility. The exception is after long holidays such as Thanksgiving and Christmas. However, during the months of April through October weekday traffic increases to about 700 vehicles per day during the week and about 800 on the weekend. At times during this peak period, CTR can receive over 1,000 customers on a weekend day.

In Table 5.3 the current traffic was increased by 30%. These projected traffic totals far exceed the current design capacity of CTR.

Table 5.3: Self Haul / Cash Customers

Customer Traffic	Current	Estimated 30% Increase	Total Projected
Self-Haul	**Vehicles/Day**	**Vehicles/Day**	**Vehicles/Day**
Ave. Weekday	524	157	681
Ave. Weekend	596	179	775
Peak Weekday	696	209	905
Peak Weekend	778	233	1011

The existing CTR facility will need to make investments to manage the current customer traffic notwithstanding any new traffic as shown in Table 5.3. CRC is proposing improvements to the entrance to eliminate traffic from queueing offsite. However, the floor space at the existing transfer station is not large enough to provide sufficient unloading stalls and space to handle a surge in waste volumes' additional space is needed to adequately handle the current traffic. Options to increase unloading space could range from adding a separate building on the west property owned by CRC to expanding the existing transfer station building.

5.2.3 – Transfer / Load Out Capacity

Providing sufficient capacity for loading and transferring future waste quantities will also need to be considered. Currently, CTR provides a single compactor that is used to load trailers for transport to the barge site in the Port of Vancouver. This compactor unit can load a trailer every 25 minutes or 1,000 TPD in 14 hrs. assuming 30 tons per trailer. As the waste quantities increase to 1,300 TPD the time to load out all waste each day will approach 18 hours. Also, this approach does not provide for a backup if the compactor is out of service for repair. For these reasons, any option for managing the waste from growth in the north service area should provide for additional load out capacity.

These represent the primary considerations for making improvements to service the north county area that are discussed in the following section.

5.3 Description of North Area Options

The CTR facility assessment identified several deficiencies in the infrastructure to manage the current waste quantities and customer traffic received particularly during peak periods that span from April to October. The option for meeting the service needs of the central and northern portions of the County are described in the following section. For each option, it is assumed that the CTR entrance will be modified to include dedicated lanes for vehicles entering and exiting the

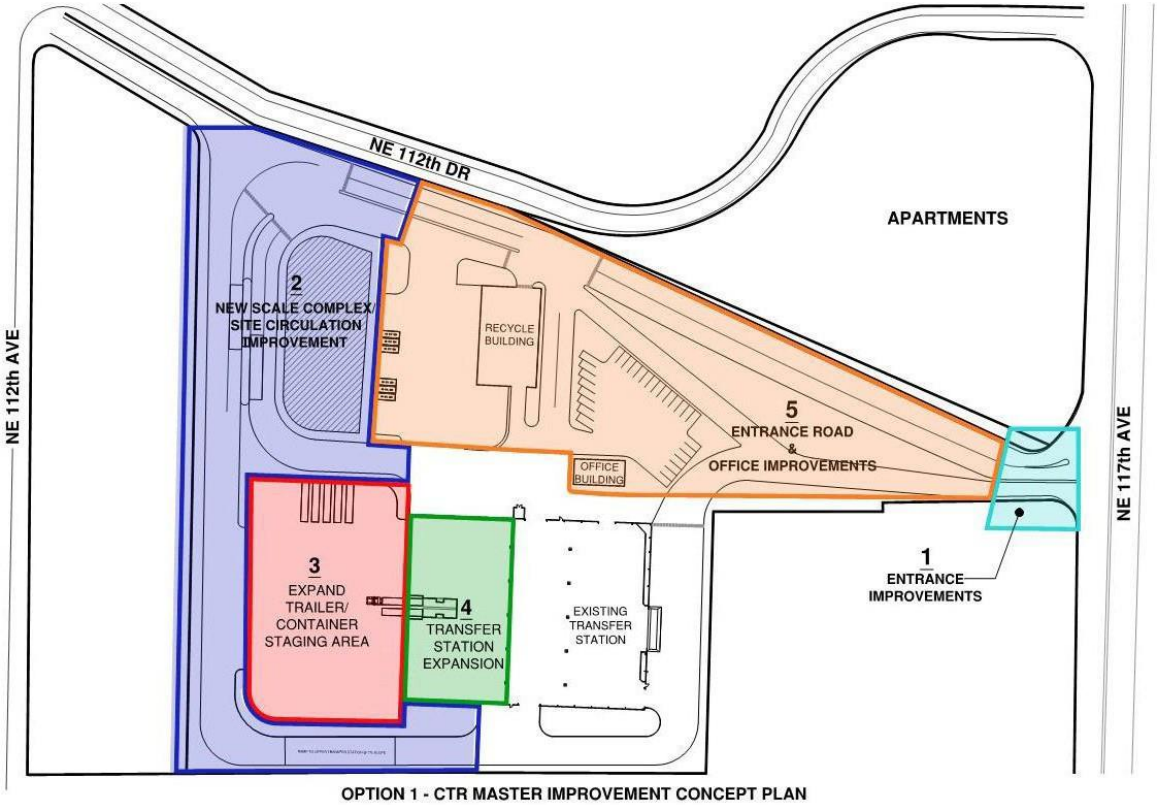
station. The new entrance will allow two dedicated lanes, one each for vehicles approaching from the north and the south on Highway 503. Also, it is expected that a new inbound scale will be needed to provide additional queue space and increase in inbound processing capacity. Other improvements to address site circulation, unloading, and material handling capacity will be dictated by what option is chosen for providing long-term service to this area.

5.3.1 – Option 1: Make Major Improvements at CTR to Address Current and Future Service Needs

This option assumes the CTR transfer station will make major improvements to address the current operational deficiencies and provide the infrastructure to manage waste resulting from growth in the central and northern part of the County. Improvements at CTR will be made to meet capacity needs for the next 25 plus years.

JRMA has prepared several concept site plans that incorporate significant improvements to meet the needs of CTR for future conditions. These have been reviewed by the County and CRC and are the basis of the improvements listed; however, more analysis will be needed to develop a final site master plan. A primary guiding principle in developing the new site plan has been the need to construct the facilities while maintaining the current operations. Therefore, the intent of the infrastructure improvements is to meet the capacity needs in a phased approach to ensure that CTR will not be closed to customer services. These improvements are captured in Figure 5.1below.

Figure 5.1: Option 1 – CTR Improvements



The improvements are expected to include the following features:

1. Improve the entrance off Highway 503 to accommodate two dedicated ingress lanes and a right-turn-only exit lane. This change to the entrance is in the design and permitting phase for approval from WSDOT.

   Benefits: Improves access and safety of vehicles entering CTR and will reduce the potential for an offsite queue.

2. Utilize the adjacent property currently owned by WCW to provide more queue space and installation of additional scales to increase capacity to process inbound and outbound customers. It would also be desirable to provide new software to improve transactions times.

   Benefits: Improve onsite queue and circulation.

3. Regrade and pave the back property to provide an area for staging trailer/containers for transport to the disposal site. Note: It may be possible to find property offsite near CTR that could serve this purpose if it is found to be cost-effective.

   Benefits: Increase capacity to load out more efficiently and improve site circulation.

4. Expand the transfer station by constructing a 26,000 sf structure adjacent to the existing building. Expansion onto the adjacent west property is predicated on the assumption the underlying soil conditions are suitable to support new structures and that land use approval is obtained.

   Benefits: Expanding the transfer station facility has several benefits as follows:

   - Increases space to provide needed stalls for self-haul and cash customers to unload more safely.
   - Provides separation of self-haul vehicles from WCW collection trucks.
   - Increases needed capacity to loadout waste and provides redundancy for compacting waste.
   - Provides floor space for managing different waste streams. Space can be allocated for green waste, C/D materials from cash customers, food waste, and recyclable materials.
   - Improves overall site circulation and minimizes intersections.
   - Should reduce double handling of materials and/or improve the efficiency of managing materials.

5. Regrade the front entrance roads and construct a new office and employee building.

   Benefits: Reconfiguring the entrance will enhance circulation and access for employees.The existing office would be relocated to reduce congestion at the entrance.

5.3.1.1 – Capital Cost

Based on preliminary concepts provided by the consultant team a planning level construction cost estimate has been prepared. To make the improvements to CTR for managing the waste and recyclables in the central and north service area for the next 25 years is estimated to cost between

$14M and $17M. This includes the cost of the new entrance improvements. These estimates are planning level and carry an order of magnitude of +15/-10% accuracy.

5.3.1.2 – Operations Cost Impacts

The efficiency of the current CTR operation can be enhanced by improving site circulation. It expands the transfer station building to provide more stalls for customers to unload and for staging materials to be loaded into trailers. The current cost to operate CTR is $22.16 per ton. A preliminary assessment of the operating expenses indicates that with major improvements to the facility labor cost may be reduced. First, with a more efficient site circulation, fewer onsite flaggers and spotters are needed. Second, the equipment operating hours may be reduced because of the increased loadout capacity as well as the addition of floor space for managing surge capacity. Accounting for some labor savings due to efficiencies for this analysis, it is assumed the operating expense is $18 per ton for the expanded CTR in today's dollars.

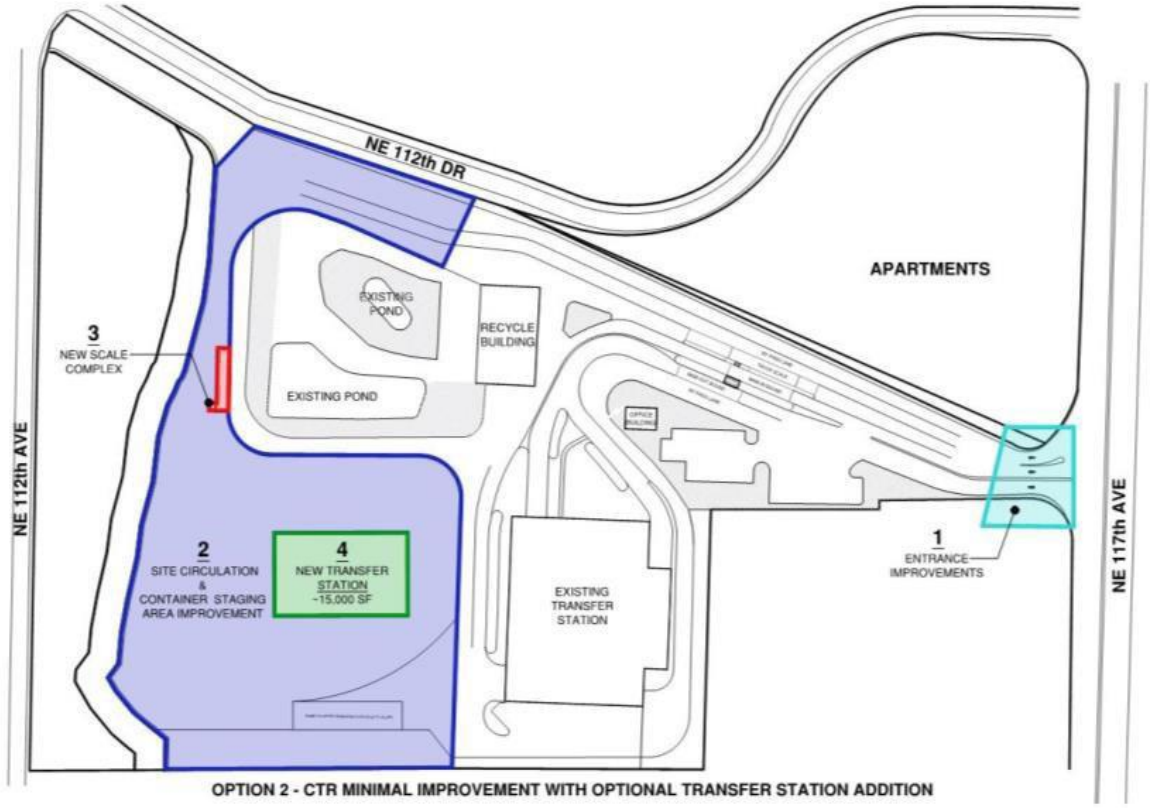
5.3.1.3 - System Cost Impacts

The CTR transfer station is in a central location to serve the area. It is also conveniently located within about 3 miles from WCW's collection truck yard where vehicles are parked and maintained. This central location means collection trucks travel fewer miles each day to begin and end their routes. Investing in CTR as a permanent location for this services area means that impacts to collection cost are minimized.

5.3.2 – Option 2: Make Minimal Improvements at CTR and Site/ Build a New North Satellite Transfer Station to Accept Primarily Waste from Self-Haul Customers.

This option assumes minimal investments at CTR. The improvements are targeted to improve onsite conditions to handle existing traffic. It recognizes that adding any more traffic with access off Highway 503 and accepting more waste at CTR as the region grows is less desirable. However, CTR is centrally located and with minimal investments, the facility can handle current traffic more efficiently. Figure 5.2 depicts the proposed improvements to the existing CTR facility to address the immediate needs. In addition to improving site circulation and eliminating offsite queueing a small building constructed on the west side of the existing transfer station may be feasible. This new structure is considered an optional investment to address self-haul customer traffic and provide additional unloading stalls.

Figure 5.2: Option 2 – CTR Improvements

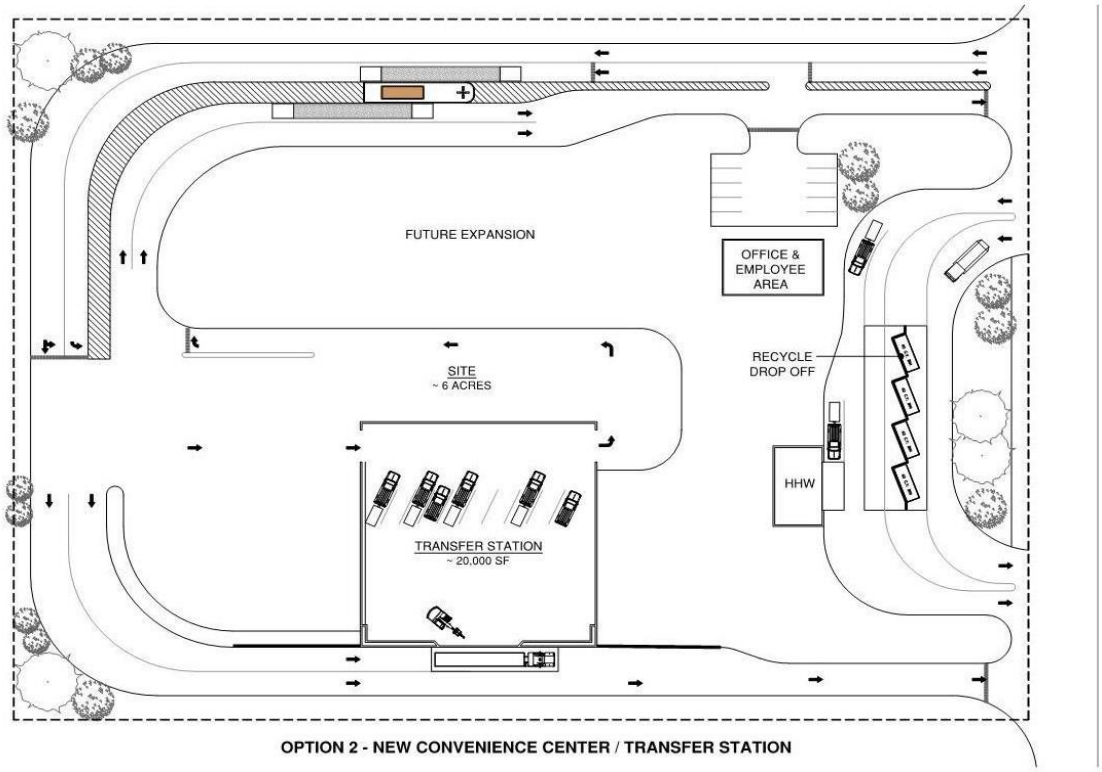


The improvements to CTR are expected to include the following features:

1. Modify entrance to accommodate lane separation for onsite queue and possibly construct access to the adjacent property on the west side similar to Option 1.
2. Regrade and pave the back property to provide an area for staging trailer/containers for transport to the disposal site. An access ramp to the south side of the transfer station would be constructed.
3. Add new scales and gatehouse to handle self-haul traffic during peak hours on WCW property on the west side of CTR.
4. Optional - Build a small transfer station (15,000 sf) to handle traffic and excess wasteunder peak conditions on WCW property.
5. Expansion onto the adjacent west property is predicated on the assumption the underlying soil conditions are suitable to support new structures and that land use approval is obtained.

These are minimal improvements to mitigate near-term operating deficiencies assuming a long-term plan of siting and building a new transfer station /convenience center to serve the north area. This facility would serve the Cities of Battleground, Ridgefield, and La Center as well as the northern unincorporated/ rural County. Depending on the final location, it may also attract customers that currently use CTR, thus improving operations at the facility. Figure 5.3 shows the proposed concept site plan for a new northern satellite station.

Figure 5.3: Option 2 – CTR Satellite Station



Features for a new northern area satellite transfer station may include:

1. A minimum site of six acres of commercial/industrial zoned property is located on a minorarterial road. However, it would be desirable to have seven to 10 acres.
2. A new convenience center/transfer Station (16,000 sf building) to handle up to 400 TPD
3. Recycling / HHW drop-off center
4. Scale complex with one inbound and one outbound scale and gatehouse
5. Top load trucks from the floor and no compactor

It would be expected to take a minimum of three years to site and permit the new facility, but this is just an estimate, and permitting a new site could be longer depending on local zoning requirements. This assumes that conducting the siting process with public involvement would be 12-18 months. The timeline for zoning approval would be similar (12-18 months) considering it would require a conditional use process. Design and construction would occur over two years meaning a new facility may take a minimum of five years before it would be operational.

Benefits of this new north area facility include:

1. Improves onsite queue and improve circulation issues at CTR.
2. Increases scale capacity and assumes new scale house software to improve transaction times.
3. Increases space to provide needed for stalls for self-haul and cash customers to unload more safely during peak conditions.
4. Provides some separation of self-haul vehicles from WCW collection trucks under peak conditions.
5. May increase needed capacity to loadout waste

6. Provides additional floor space to provide flexibility for managing different waste streams.
7. Adds new facility to serve the northernmost County more efficiently.
8. May reduce overall traffic at CTR and reduces drive times for self-haul customers when a satellite facility is operational.

5.3.2.1 – Capital Cost

Under Option 2, the improvements at CTR would be constructed as soon as possible to improve operations. Since would provide improved conditions in the short term while locating a site for a new transfer station to serve the northernmost County is being conducted. The cost for constructing the entrance improvements and adding a new scale complex on the west side is estimated to range from $4M or to as much as $6.2M. This higher estimate assumes that a new public transfer station (approximately 15,000 sf) will be built on the west side property This is a planning-level cost estimate since no detailed plans have been made to date with exception of the new entrance.

The cost to construct a new north transfer station is estimated to be about $9M. This includes the estimated cost of purchasing a 6-acre site at $200,000 per acre. The cost of siting the new station might be $500,000 to $800,000 depending on the environmental permitting requirements to complete an Environmental Impact Statement.

The total cost of this option to the system is estimated to be between $13.5M and $16.2M.

5.3.2.2 – Operation Cost

Operational costs are expected to be more than Option 1 or 3 since there will be two separate transfer stations facilities needed to serve the area. In addition, there will be additional costs for transporting waste in transfer trailers from the new north station. The trailers hauling waste could be transported directly to Wasco County Landfill or they could be transported to West Van and re-loaded by compactor into containers for transport to Finley Buttes. Re-loading containers at West Van would require handling materials twice and, therefore direct trucking to the Wasco Landfill may be more cost-effective.

Similar to Option 1 this alternative includes some improvements to the CTR's site circulation. It also assumes no significant increase in waste volumes. So, like Option 1 the cost to operate the upgraded CTR transfer station is assumed to be $18 per ton. The cost to operate the new North Transfer Station is expected to be $42 per ton based on ultimately managing anywhere from 200 tons to 300 TPD. This cost of service is similar to the cost to manage the self-haul waste stream at West Van.

5.3.2.3 – System Cost Impacts

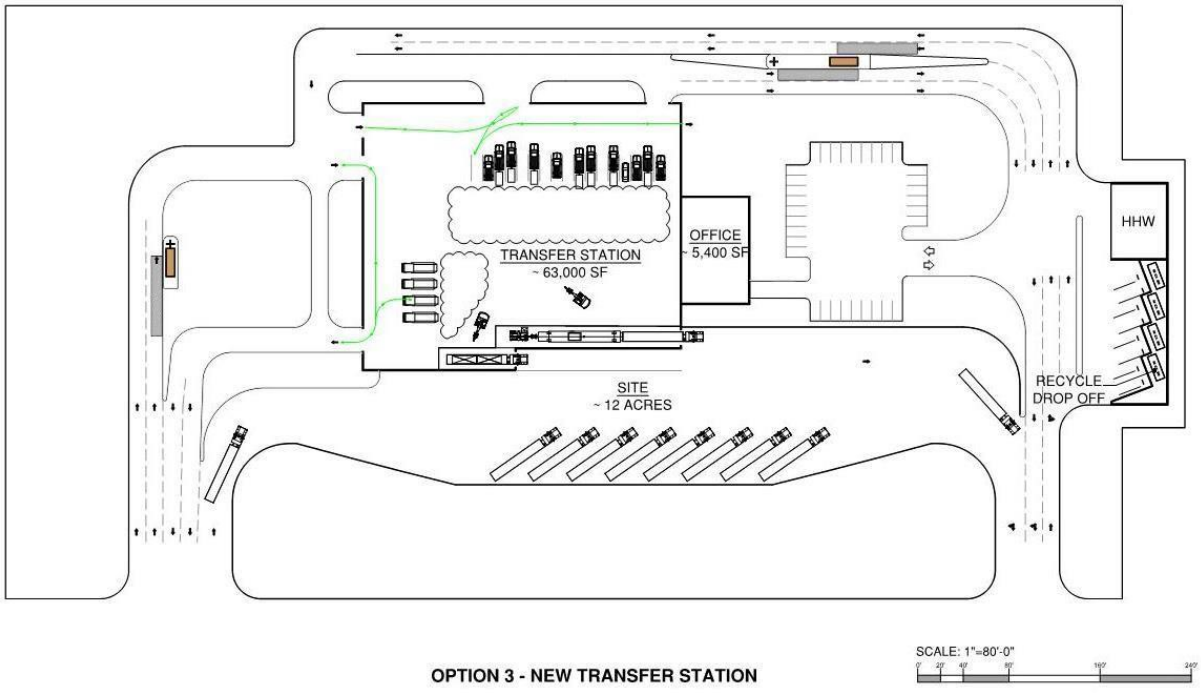
There should be no major impacts to the collection system with this option. Many self-haul customers in the northernmost part of the County would drive less distance to use the new transfer station. Collection trucks serving Battleground, Ridgefield, La Center, and Yacolt could also use the northern transfer station, thus reducing their time to conduct a second route versus traveling to CTR and back to the route. In the afternoon or second route they could use CTR since it is assumed, they would be parking in the evenings at the main WCW hauling yard on NW 94th Avenue.

5.3.3 – Option 3: Replace CTR with New Transfer Station at a New Location

The CTR transfer station was not designed to handle the traffic and quantities of waste currently being received. Over the past five years, there have been many new developments in the surrounding properties. This includes new residential developments as well as institutional operations (i.e., new school and church). With the expected growth, investing in the current CTR site may not be the best long-term site. One option is to make minimal investments in CTR to address immediate operational needs and establish a new location to serve for the long term.

To provide for future waste management and recycling services a modern transfer station would be sited and constructed somewhere north of the existing location. Ideally, the new stationwould still be somewhat central to the majority of the population it serves and be located on commercial /industrial zoned property with access off an arterial or major collector street. It wouldbe located to serve the current service area as well as the growing area of the North County cities. Figure 5.4 below shows the proposed concept site plan for a new transfer station to replace CTR.

Figure 5.4: Option 3 – New Transfer Station



The following describes the key features of a new transfer station:

1. A minimum site of 12-acres of commercial/industrial zoned property located on a minorarterial road.
2. A new transfer station building (approx. 66,000 sf building) to handle up to 1,500 TPD.
3. Minimum of two (2) load-out ports equipped with compactors and one top load port to beused as backup and for other materials.
4. A recycling / HHW drop-off center.
5. Preferably a separate or split access drive for collection trucks to separate from self-haul

traffic for safety reasons.

6. Separate scales for weighing collection trucks with RFID readers and the capability to weighout vehicles.
7. Parking area for staging trailers and containers.
8. Office and employee break/restroom and training area.
9. Possible education center for tours.

This facility would also incorporate green design features such as natural lighting, recycled-content building materials, water conservation features, renewable energy features, and modern odor, and dust control systems.

5.3.3.1 – Cost Impacts

The cost to construct a new transfer station is estimated to be between $25M and $30M. This includes the cost of land assumed to be about $200,000 per acre in 2020 dollars. The timeline to site and permit a new station, as discussed in Option 2 is expected to require about three years and may be subject to additional environmental reviews due to the volume of traffic and amount of waste managed at the new facility. This does not include possible legal challenges that might occur during permitting process. The time to complete the design and construction would be two years.

5.3.3.2 – Operations Cost

Operational cost should be lower than the current CTR as the new facility will incorporate means to better manage materials, eliminating any double handling and minimize the need for spotters andtraffic management personnel. For this option, the cost to operate the new North Transfer Station is assumed to be $18 per ton.

5.3.3.3 – System Impacts

The new transfer station is expected to be located north of the current CTR station. This is based on the availability of land and the difficulty to locate a suitable site in the more urbanized area. Therefore, the cost of the collection system is expected to increase as vehicles will travel more miles to unload. The drive time for collection trucks may increase from 3 miles per trip to perhaps 6 miles. The increase in collection cost may range from $1.2M to $1.6M per year.

5.4 Analysis of the Options

In discussing each of the options, the relative cost impacts were presented. In this section, a comparison of the cost impacts of each option is presented. The purpose is to evaluate the cost to provide services and operate the facilities considering which option is pursued. Using the capital and operating cost discussed previously, the following tables show the comparison of the cost to operate the system in 2035 assuming the North Area will need to manage 305,000 TPY.

As shown in Table 5.4 on the next page, the lowest operating cost would be to make major improvements to CTR versus building a second satellite transfer Station or totally replacing it with a new larger North Transfer to serve the northern portion of the County. The cost to operate either Option 2 or 3 will also result in added system cost. For instance, under Option 2 the system would operate two separate transfer stations (CTR and satellite facility) to serve the north-central portion

of the County. This results in higher operating costs and the system will incur added expenses needed to transport waste from the satellite station to either the Port for reloading for barging or to drive further to Wasco Regional Landfill.

Table 5.4: Comparison of the Capital and Operating Cost in 2035

North Area Service Options		**Option 1**	**Option 2**		**Option 3**
Description		***CTR Major Improvement***	***CTR Minor Improvement***	***North County Satellite TS***	***New North County TS***
Estimated Capital Cost (2020$)		**$ 16,000,000**	**$ 6,000,000**	**$ 9,000,000**	**$ 30,000,000**
Annual SW Tons (2020)	230,000				
Route Tons	156,000				
SH / Com Tons	74,000				
Route Ton Ratio	68%				
2020)					
CTR Operations Cost/Ton (2020)	**$ 22.00**	**$ 18.00**	**$ 18.00**	**$ 42.00**	**$ 18.00**
2035 Waste Quantities - North Area					
2035 Solid Waste -Tons/Yr.	305,000				
2035 Operations Cost/Ton	**$ 28.65**	**$ 23.44**	**$ 23.44**	**$ 54.70**	**$ 23.44**
Annualized Capital Cost (20 yr. @ 5%)		**$ 1,283,881**	**$ 481,456**	**$ 722,183**	**$ 2,407,278**
Incoming Solid Waste Tons/Yr.		305,000	207,400	97,600	305,000
Annualized Capital Cost /Ton		**$ 4.21**	**$ 2.32**	**$ 7.40**	**$ 7.89**
Summary of Operating Cost /Ton -2035					
North Service Area - Cost/ Ton		**$ 27.65**	**$ 25.77**	**$ 62.10**	**$ 31.34**
System Cost Impacts					
1. Additional Transport Cost		$0.00	$0.00	$2.00	$0.00
2. Additional Cost for Collection		$ -	$ -	$ -	$ 1,673,006
Add. Collection Cost per Ton					$ 5.49
TT&D + collection Cost per Ton		**$ 27.65**	**$ 25.77**	**$ 64.10**	**$ 36.82**

**Key Assumption: Unit operating costs are assumed to increase by 1% per year and waste is projected to increase by an average of 2.2% per year for the next 15 years.*

Under Option 3 replacing the CTR with a new larger transfer station farther north, nearer to Battleground and Ridgefield, would add to the cost of the collection system.

Another factor to consider is how much waste will be managed by a new satellite transfer station which cannot be predicted. To understand the cost impacts two scenarios were analyzed. The first scenario assumes 30% of the north area uses this station. The average cost of operating both CTR and the satellite would be over $37 per ton. This is presented in Table 5.5 on the next page.

Table 5.5: Comparison of Operating Cost Assuming 30% of Waste Generated Uses New North Satellite Station

Annual Operating Cost Comparison	**$8,434,530**	**$11,405,231**	**$9,557,927**
Assumes 30% of North Area Uses New Convenience Center			
Comparison of Operating Cost Per Ton	**$27.65**	**$37.39**	**$31.34**

Table 5.6 assumes only 20% of the waste generated in the north area uses the satellite. In this scenario, the average cost to operate the transfer station system is less than $34 per ton.

Table 5.6: Comparison of Operating Cost Assuming 20% of Waste Generated Uses New North Satellite Station

Annual Operating Cost Comparison	**$8,434,530**	**$10,261,128**	**$9,557,927**
Assumes 20% of North Area Uses New Convenience Center			
Comparison of Operating Cost Per Ton	**$27.65**	**$33.64**	**$31.34**

5.4.1 Findings

In comparing options for serving the north and central part of the County, Option 1 is estimated to be the lowest capital cost and it results in lower long-term operating costs. This doesnot account for impacts on the collection system. There are several factors to consider when moving forward with long-term transfer station operations at CTR. One consideration is the compatibility with the adjacent properties. Over the past 10 years, new multi-family dwelling units have been constructed on the north side. On the west side of NE 112 Ave in the back of the transfer station, a new single-family residential development is being built. While these new residential properties were aware of the existing operations the neighboring land uses have changed. Another consideration is the access restrictions onto Hwy. 503 being placed on the facility by WSDOT. Once the new entrance construction is completed in 2021, all traffic leaving CTR must turn right or south on Hwy. 503. Customers traveling from the north will need to find a route to return to their north county destinations.

In designing new improvements at CTR there are physical changes that can enhance visual impacts Improvements can be constructed in phases in order to keep the facility operating during the construction period. Option1 does assume that underlying soil conditions on the adjacent west property are suitable for building structures and that land use approval can be obtained. Both Options 2 and 3 are reasonable solutions for meeting the long-term service needs but both will require siting a new facility. Despite challenges to site a new station, under Option 3, locating a new transfer station within an industrial commercially zoned neighborhood may have long-term advantages. The new station could be designed to optimally handle traffic and future waste from growth. It can also provide the flexibility to add features to adapt to changes for managing waste brought on by new regulations or new programs identified in the updated SWMP.

Chapter 6

Capital Improvement Needs Assessment and Financial Analysis

6.1 Introduction

A significant component of the Regional Study is the completion of the condition's assessment of the current transfer stations. The assessment had two purposes. First, to assess the condition of each of the three facilities to identify improvements and repairs that should be performed in the near term based on current operating conditions. Overall, our conditions assessments for the entire transfer station system concluded there are fairly minor repairs needed for structures and site paving; such repairs are needed as a result of normal, expected wear and tear. These repairs can be completed in the short term over the next few years.

The conditions assessments also identified facility repairs and improvements that are required to meet the long-term needs of the regional solid waste system. There have been no major expansions of the transfer stations to address increased traffic and waste volumes and future service needs. As a result of growth in the County over the last ten years, both the CTR and Washougal stations are undersized to efficiently manage the current waste volumes and customer traffic. They will need to be upgraded and expanded to address current operational needs and to handle future growth.

The project team developed several concept plans to address the long-term needs of the three transfer stations. The concept plans presented in Chapters 4 and 5 were thoroughly reviewed by WCW, which owns and operates the transfer station system. These concept plans were developed in sufficient detail to make planning level construction cost estimates to prepare a CIP and determine impacts to rates for financing these improvements. The capital improvement needs are based on preliminary concepts that must be reviewed and finalized in the Phase 2 report.

6.2 Capital Improvement Plan

Considering the findings presented in Chapter 4 of this report, the following describes the results of the conditions assessment and the assumptions used to identify the capital investments for each of the three transfer stations. Conceptual plans were prepared for both CTR and Washougal. For West Van, the improvements are listed, but no concept plans were developed as it is recommended that a master site plan be prepared for the complex to incorporate future changes to the MRF processing system and other operations.

6.2.1 CTR Improvements

CTR currently receives almost 60% of all solid waste generated in the County; it is the busiest of the three transfer stations. Since its opening in 1991, there have been no significant

improvements or expansions to the original facility. The conditions assessment identified several improvements needed to address current operating deficiencies as well as expansions required to address future growth in the north service area of the County. Chapter 5 addressed the long-term facility options for the north-central part of the County, an area where the largest population growth is expected. The options presented included the following:

1. Make major improvements to CTR to service the north portion of the County
2. Make limited improvements to CTR to address traffic queueing and circulation problems and build a new satellite transfer station in the north to serve the cities of Battleground, Ridgefield, and La Center.
3. Build a new transfer station in the north /central portion of the County and close CTR.

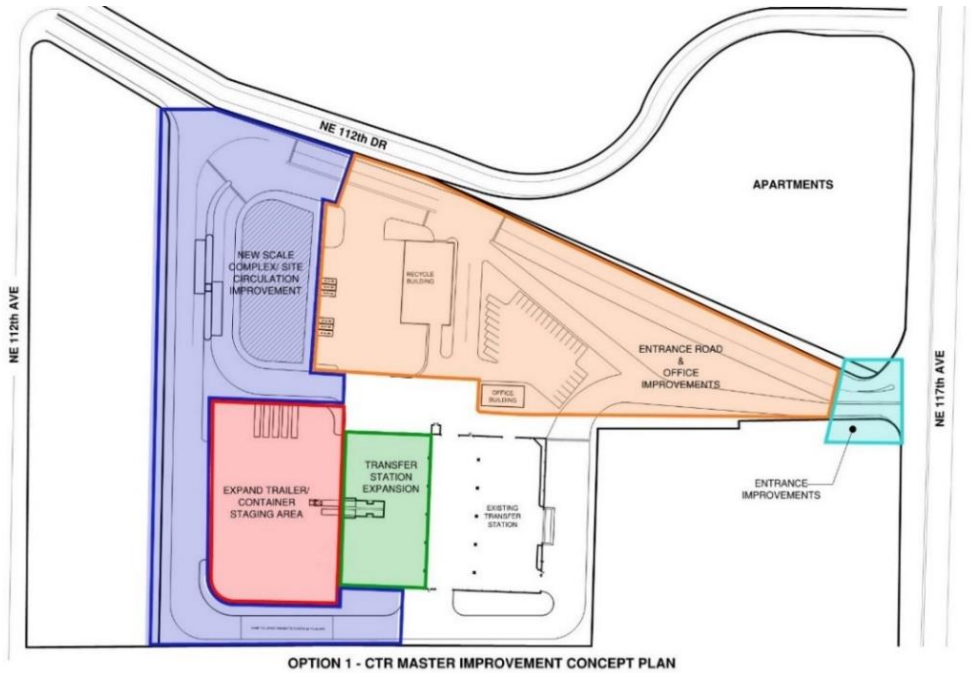
The North County Service area study summarized in Chapter 5 established that making a major expansion to the CTR would result in the lowest capital cost. However, it will require expanding onto the adjacent property on the west side. This property was a former landfill and is partially used to stage containers and park rolling stock for transfer operations. Expanding onto this site will require further investigation into underlying soil conditions and obtain land use approvals as it is a separate property. Also, adjacent properties have transitioned to residential developments, and access onto Hwy. 503 will be restricted to right turns only when exiting the site. These conditions lead to evaluating the option of siting a new transfer station to replace or augment the current CTR facility in order to meet the long-term growth in the central and north part of the County previously discussed.

6.2.1.2 CTR Expansion Concept Plans

The project team developed several concept plans for making improvements at CTR that include modification of the entrance off Hwy. 503. The entrance improvements include adding channel lanes that will provide separate inbound lanes to receive customers from both the north and south directions. Whereas these improvements will help to avoid off-site queue issues, they do not address onsite circulation and limitations in the facility's capacity to handle the current and future traffic and the increased waste quantities.

Several master site plan options were developed to address the short and long-term service needs of this area. There are many similarities in each of the options, mainly related to providing for improved site circulation and expanding the existing transfer station. However, there are several variations to the site plans in the space allocated for managing various waste streams that require further review with WCW and the County. The optional site plans are included in Appendix A.

The Option 1 site plan was used to prepare construction cost estimates for the CIP. This plan includes the new entrance improvements currently being designed and permitted as well as a phased development plan to make various improvements to maintain operations during construction over the estimated three to five year period. The concept plan shown on the next page shows the improvements to be considered.



OPTION 1 - CTR MASTER IMPROVEMENT CONCEPT PLAN

The improvements are expected to include the following features and phases:

Phase 1 – Scheduled to be completed the last quarter of 2021 (Turquoise)

Improve the entrance off Hwy. 503 to accommodate two dedicated ingress lanes and a right-turn-only exit lane. This change to the entrance is in the design and permitting phase for approval from WSDOT.

Phase 2A – Add new scale complex and access ramps to transfer station (Blue)

Utilize the adjacent property currently owned by WCW to provide additional scales to increase the capacity to process inbound and outbound customers. It would also be desirable to provide new software to improve customer transactions times.

Reconfigure stormwater pond to maximize roadway surfaces and complement site improvements.

Phase 2B – Regrade and pave that back property on the west side to provide for trailer/ container staging and parking. (Red)

By regrading this area, the operator has a large area for staging transfer trailers. The improvements will also provide access to future load-out ports to be constructed with the expansion of the transfer station in Phase 3.

Phase 3 - Expand the transfer station by constructing a 26,000 sf structure adjacent to the existing building. (Green)

These improvements will provide the infrastructure to address current capacity issues and provide space and facilities necessary to effectively handle future traffic and waste quantities.

Phase 4 – Regrade and pave entrance roads and construct a new office and possibly include a new recycling drop-off area. (Light Brown)

By regrading and paving this area there are opportunities to improve circulation and construct a new office /employee facilities.

Overall, these multi-phased improvements provide the following operational and customer service benefits:

a. Provides sufficient space for onsite traffic queue and safe vehicle circulation.
b. Increased space to provide needed stalls for self-haul and cash customers to unload more safely.
c. Provides separation of self-haul vehicles from WCW collection trucks which supports safe operations.
d. Provides additional capacity to load out waste and provides redundancy for compacting waste.
e. Provides more floor space for managing different waste streams. Space can be allocated for green waste, C/D materials from cash customers, and recyclable materials.
f. Improves overall site traffic circulation and minimizes intersections or crossing traffic patterns.
g. Reduces double handing of materials and/or improves the efficiency of managing materials.
h. Provides new office space and employee break rooms/restroom facilities.

6.2.1.3 Capital Improvements Cost Estimates

Based on preliminary concepts provided by the project team a planning level construction cost estimate has been prepared to accompany the plans. The higher construction costs shown assumes building a new recycling center and includes a 25% contingency.

A second option was developed by WCW, Option 1A, and assumes the current CTR recycle center is retained and includes a 15% contingency. In Chapter 5 North Service Area presented three options for providing future services for these customers.

CTR Option 1A - Major Improvements (w/o New Recycle Center)	
Entrance Improvements (2021)	**$700,000**
NEW ENTRANCE ROADS AND GATEHOUSE	**$3,800,000**
Description 1 Site grading an paving for Approx.. 2 acres 2 Office Employee Building 4000 sqft 3 Scalehouse and Scales (2) 4 Upgrade Site Landscaping Fencing	
RECYCLE BUILDING IMPROVEMENTS	**$0**
Description 1 New Recycle Center 2 Grade andpave area fo rnew recycle buildng	
TRANSFER STATION	**$9,500,000**
Description 1 Add 26,400 sq ft PEMB - 2 Story 2 Fill and site work 1.7 acres 3 New scalehouse and scale 4 Retaining walls	
PURCHASE PROPERTY	**$0**
Description 1 The adjacent parcel to CTR is owned by WCW	
Total W/ 15 % Contingency	**$14,000,000**
Assume CTR Improvements - $14,000,000	

These cost estimates provided for Option 1 and 1A are planning level and carry an order of magnitude of +15/-10% accuracy.

6.2.2 Washougal Transfer Station Improvements

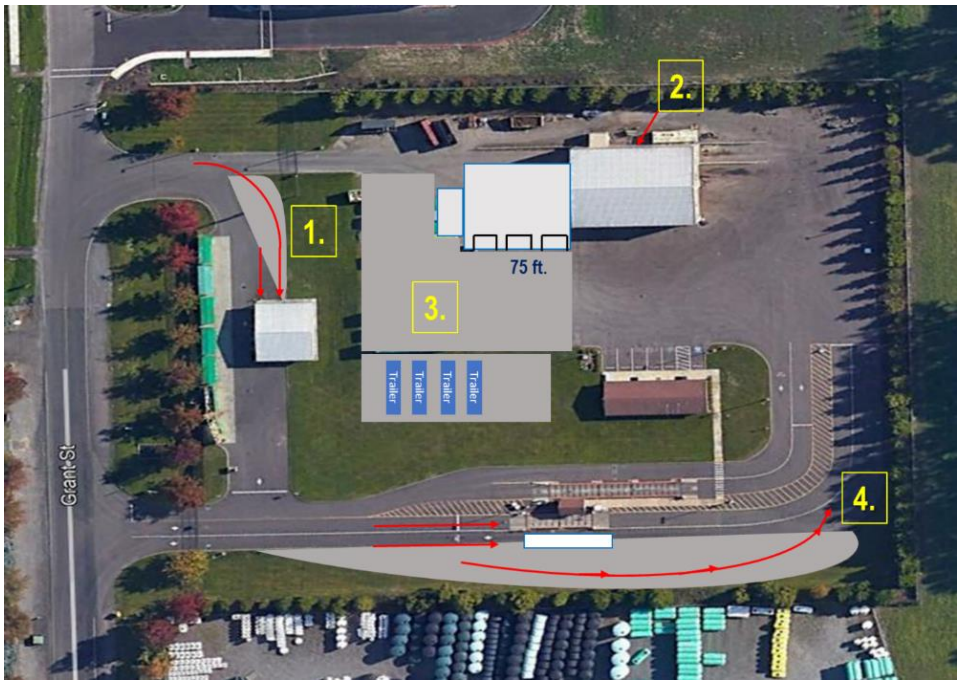
The assessment of the Washougal Transfer Station in Chapter 4 concluded the current facility is operating at near capacity. The facility accepts self-haul traffic on Wednesdays where it receives an average of 18 vehicles per hour. The station has only three bays and six stalls for self-haul customers to unload. When self-haul customers are present commercial collection trucks must unload using the south door, which reduces floor space to store waste and stage load-out operations. On Saturdays, the facility receives an average of 30 vehicles per hour. On occasion, traffic can back onto the public right of way.

Annual waste volumes are projected to increase by 23,000 TPY based on future population growth over the next 15 years. The facility currently receives 32,000 tons annually; therefore, additional waste volumes would increase by 72% over the next 15 years. This increase will likely increase the number of self-haul customers using the station. The facility has been in operation since 2009. The receiving building will need to be expanded to provide additional stalls to unload and space to provide for staging waste for loading in trailers during peak hours.

The conditions assessment identified some immediate improvements intended to minimize damage to the building siding by adding a backsplash to the load-out area. Constructing a push

wall along the transfer trailer load-out area will provide the ability to stack waste to increase surge capacity. The combination of the push wall and a backsplash with a load-out chute will help reduce spillage during loading operations.

The improvements are shown in the master site plan below. Item one shows an expansion to the entrance to the recycling drop-off / HHW area. Item two shows the modifications to the load-out area. The major improvement is to expand the transfer station building by an estimated 5,000 sf including a 500 sf lean structure to store e-waste, bulky or special waste, which is represented by item three.



It is recommended that a further review of the master plan be conducted to verify the size and orientation of the building expansion. This review should consider whether the scale house complex should be expanded during this project or it could be scheduled at a later time (Item 4). The cost to expand the scale house complex and entrance road was not included in the CIP. Also, with further study, a larger structure might be required and therefore should be included as a contingency item. The table on the following page lists the estimated costs of capital improvements over the next three to five years.

Washougal Transfer Station - Improvements	
BUILDING MODIFICATIONS	**$80,000**
Description 1. Repair building and add back splash/chute 2. Add push wall at load out to provide surge capacity	
BUILDING EXPANSION	**$860,000**
Description 1. Add new public unloading structure (5,500sf) with lean to for e-waste storage 2. Pave access and storage yard (20,000 sf)	
WIDEN DROP OFF ENTRANCE	**$30,000**
Description 1. Expand drive aisles to HHW Bldg.	
CONTINGENCY – (assumes lager expansion)	**$500,000**
Assume Washougal TS Improvements	**$1,470,000**

The construction cost estimates prepared as part of this study are planning level estimates and should be updated in conjunction with a more detailed design development phase. Since these cost assumptions are based on preliminary concept plans, the estimates represent a lower range of the improvements needed. With further evaluation, it may require the expansion to build out a larger building to handle the future growth of the East County. It is recommended for planning purposes to assume a range of $1M to $2M for future expansion.

6.2.3 *West Van Improvements*

The West Van Transfer Station and MRF is a mainstay facility in the County system and is a significant resource for managing recyclable materials collected from residents and businesses. The 91,000 sf transfer and recycling building is located on a 21 plus acre site. The complex has several operations that handle various materials. Over the last three years, West Van averaged 104,000 tons annually, which is 26% of the total waste generated within the County. The facility also receives and processes 60,000 tons of commingled recyclable materials. Green waste and wood are accepted and processed for shipment to out-of-county compost facilities.

The results of the condition assessment of West Van were that there were no near-term or significant capital improvements required. The growth in the waste stream is expected to be marginal, and the current facilities have the capacity to properly manage and transfer current and future incoming waste streams. A new compactor was installed in 2020 that can process 900 tons in a 12-hour shift. West Van currently receives 400 TPD.

It is recommended that WCW and the County collaborate in preparing a long-term master site plan for the West Van transfer station complex. This should be completed considering the following activities.

1. Install new equipment identified in the MRF assessment report to increase throughput, improve product quality, and increase overall processing efficiencies. This equipment can be repurposed into a new, more advanced processing system depending on the decision whether to relocate to a new facility.
2. A decision to build a new MRF would make almost 45,000 sf of building available that can be used for various operations. Some options include:
    a) Evaluate current transfer station operations to address site traffic circulation and material handling needs.
    b) Installing a C/D processing system to recover materials and reduce waste disposed of.
    c) Relocating the organics receiving and processing operations. This would include providing an area to receive source-separated food waste and/or yard waste mixed with food waste.
    d) Identify other operations deemed necessary to enhance long-term solid waste and recycling services.

The MRF Feasibility Study (Chapter 7) considers the option to relocate to a new location or possibly convert CTR to a new MRF. This assumes the decision is to site and build a new transfer to replace CTR. The option to convert CTR and install a new processing system would allow the space (approximately 45,000 sf) at West Van to be repurposed.

The West Van facility is a valuable asset that can be expanded to provide additional infrastructure for the County system. By considering the options mentioned, a master site plan and CIP should be prepared to manage investments at West Van for the long term.

6.3 MRF Equipment Improvements

The project team completed a full assessment of the existing MRF equipment. The result of this assessment was the current system would need to be replaced with a more advanced processing line in the future. A full feasibility study will be completed to determine whether to install a new process system at West Van or possibly build a new MRF at a new, centrally located site. This feasibility study is part of the Phase 2 report.

The assessment did identify where the current system could be upgraded with new advanced unit processing equipment. Potential equipment Improvements include the following:

a. Add optical sorters on the plastics line to increase yield and decrease residue.

b. Install robotics to select process line locations to improve quality and reduce labor.

c. Replace vibratory screens with ballistics screens to improve material flow and related recovery.

d. Enhance eddy current separator

e. Install large drum feeder to reduce surging and improve material flow and related recovery.

f. Add paper optical sorter to increase paper quality and decrease labor cost per ton

West Van MRF Improvements - Equipment	
Description of MRF Equipment	**Estimated Cost**
1 Add coded signage to improve safety and quality of materials	$50,000
2 Optical Sorter for fibers - (8-10' wide, 7-10 tph of fiber over the optic, includes high speed belt, etc.)	$1,000,000
3 Optical Sorter -Single eject optic (assume PET)	$500,000
4 New Ballistic screen with 8 Paddle finishing ballistic, installed (old screen removed)	$1,500,000
5 Add Robotics - Assumes one vision/camera, 2 picking arms	$500,000
6 Install Drum Feeder	$500,000
7 New Eddy Current Separator	$235,000
Assume Total MRF Improvements (2020$)	**$4,285,000**

There are several immediate benefits that could be realized with these improvements that include:

1. Increase throughput/production by five to 10 tons per hour. This increase in throughput will help reduce overall cost but also increase plant capacity.
2. Reduce the sorting labor cost associated with the current system. Both optical and robotic sorting typically increases sorting productivity on average by 30 to 50% per position.
3. Enhance the quality of the commodities (i.e., producing bales with less contamination and generating higher revenue/ton).

It is intended that the aforementioned equipment improvements can be installed at the existing MRF and can later be integrated into a new process line.

6.4 Capital Improvement Needs

The existing transfer stations do not have the capacity to manage current waste flows and traffic from customers. CRC has adapted to these conditions to operate safely, but the facilities are undersized to efficiently manage the current customers, and waste volumes and certainly cannot handle that generated from growth in the County. In addition, there are no planned facilities to handle other waste streams or integrate programs to reduce waste disposed of. The solid waste industry is trending to better manage waste as a resource by separating organics and recycling more materials. The infrastructure required to meet the demands of these trends needs to be incorporated into modernizing the regional system.

The assessment of capital improvements needs ranges from making investments at current facilities to expand capacity for basic services to siting a new transfer station or MRF and retrofitting existing facilities. This approach provides some flexibility for adding new services.

6.5 Transfer Station Improvements at CTR

CTR - Immediate Capital Investments (2 years)

The JRMA team prepared several options for expanding CTR to address current deficiencies and handle future growth. These are presented in Appendix A. The most immediate need in the system is to make improvements at CTR to address safe ingress and egress off Hwy. 503. The first step is to modify the entrance to allow for two separate lanes entering the facility. This improvement is under construction and will be completed in the last quarter of 2021 at an estimated cost of $600,000. CRC is managing this project. Once the new entrance is completed, customers exiting CTR can only turn right and travel south on Hwy. 503. Customers originating from north of CTR, such as Battle Ground, Ridgefield, La Center, and Yacolt must find a route to return to the north county.

The second improvement is to add lanes for inbound customers and eliminate any vehicles from queuing off-site onto Hwy. 503 is critical. In Chapter 4 a concept plan was developed to build a new access road on the west side property with a new scale to weigh in customers. This will allow customers to travel a much longer entrance road to a new scale for weighing in. This will eliminate the off-site queue of vehicles. The estimated construction cost is between $2M and $3M. The final alignment of the access road and supporting facilities are being considered by CRC.

Once these improvements are made, CTR can more safely function with less impact to Hwy. 503. The County must decide whether continue to make further investments at CTR or site a new transfer station. The north-central portion of the County has seen significant growth in the last 20 years and is projected to experience the largest growth in the next 15 years. Waste generated in the north county is expected to increase by as much as 75,000 TPY or more. The decision whether to expand the transfer station operations at CTR or to site and build a new transfer station to serve the north /central portion of the County should be made prior to moving forward with the Phase 2 report.

Preliminary construction estimates place the cost expand CTR to range from $14M and $17M. This does not account for the unexpected cost to address required foundation improvement to support structure that might be necessary due to underlying soils on the west property. The plans prepared by the consultant team demonstrate the expansion to take place in several phases that will permit continued operations during construction.

CTR Improvements

Phase 1- 2 – Expand entrance and new access road and scale $2M – $3M

These improvements are designed to eliminate traffic from queueing onto Hwy 503 and should be moved forward immediately.

Phases 2B -5 – Expand transfer station on west side property and upgrade front end entrance $12M - $14M

Estimated Total CTR Construction Cost (All Phases) **$14M - $17M**

New Transfer Station to North /Central County

In Chapter 5, options for serving the north and central part of the county were evaluated. The decision to site and build a new transfer station will require more capital than the option to expand CTR. Given the conditions at CTR, the County and its partners may wish to pursue this option. The estimated construction cost is expected to range from $25M to $30M. Depending on the location in relation to the existing WCW hauling yard on NE 94th Ave, there could be some increase in the total transportation cost. But a new station can be designed to operate more efficiently than CTR as it can incorporate better site circulation and material handling features. Another benefit is that a new facility can provide flexibility to managing different waste streams.

The criteria for siting a new station will be to locate parcels zoned for industrial/commercial or agricultural uses with access to arterial or collector streets. But under the County zoning rules, solid waste facilities can be permitted in most zones under a conditional use process. Siting a new station will likely encounter some resistance from neighboring property owners in the area.

New Transfer Station - Estimated Construction cost **$25M - $30M**

Washougal Transfer Station Improvements

Washougal will need to be expanded within the next five years. Currently, it only receives self-haul traffic on Wednesdays, Fridays, and Saturdays. During the week, there are limited stalls for the public and commercial collection trucks to unload. Operating space inside the station is minimal. The County is considering expanding hours of operations to other weekdays and Sundays. This action would impact operations making it necessary to expand the facility.

The cost for making improvements is estimated to be about $1.5M. Because these are very preliminary costs, it is recommended that the range of improvements be increased to $2M for planning level purposes.

Site improvements and Expansion **$1.5M - $2M**

West Van Transfer and Recycling Center (West Van)

The assessment of the West Van Transfer Station does not indicate the need for immediate capital improvements. The facility is located on a 21 plus acre parcel, making it a valuable asset in the County's solid waste system. What future services West Van provides to the system is dependent on where commingled materials will be processed. The MRF feasibility study provided several options ranging from making minor improvements to the existing building and installing a new processing system to relocating the West Van MRF to a new central location. Another option presented is to convert CTR to a MRF if a new transfer station is sited.

Options for Providing Infrastructure for a new MRF processing System

WV-1 – Install new equipment in existing West Van structure	$4M
WV-2 – Install new equipment in expanded West Van Structure	$6M
New MRF Facility	$25M
Convert CTR to a MRF	$8M

The construction cost estimates for the different MRF infrastructure options do not include the cost of the new processing system. A new equipment line is expected to cost between $15M and $18M. CRC has invested in upgrading the existing system, and some of the equipment recently purchased could be used in the new system

The estimated construction costs for the improvements listed are in 2020 dollars. However, the improvements are expected to be completed over the next two to ten years. Construction costs are based on conceptual site plans and are used for developing a 10-year financial plan. More detailed plans are necessary to define improvements and scheduling better to improve accuracy. All cost estimates are planning level and carry a +15/-10% probability.

Summary of Capital Needs

There are several options for upgrading and expanding the transfer stations for managing the County's solid waste for the next 20 years. There have been no significant expansions made in the past 20 years, with exception of the Washougal station in 2009. The system does not have the infrastructure to efficiently manage the number of customers and waste generated now and in the future. Based on the completed conditions assessment study, the findings of the report indicate that modernizing the transfer system will require roughly between $20M and $35M. This does not account for new equipment such as compactors which could add another $2M to $4M depending on what options are chosen.

CRC has recently added some new equipment to the existing material recovery processing system at West Van. These investments have improved the performance of the equipment line that can stave off, for a few years, the need to install a modern processing system using the latest technologies. But as the feasibility study summarizes (presented in Chapter 7), the processing cost can be reduced from an average of about $128 per ton to $105 per ton with a new system. By installing a modern material recovery system and increasing material volume from other jurisdictions, the unit cost to process could be less than $90 per ton. The cost for providing the infrastructure for installing a new materials recovery processing system ranges from $4M to $8M if either the West Van site is expanded or if CTR is repurposed. If a new MRF is sited and built, the cost would to approximately $25M.The added value of relocating the MRF out of the West Van site would add 45,000 sf of the building that could be used for future waste and recycling operations.

Considering the infrastructure improvements for both the transfer station and recycling systems, the County can expect to invest between $25M to $50M over the next ten years. There are several options for expanding and modernizing the infrastructure needed. It is important to acknowledge the need to upgrade and expand the transfer station infrastructure in the County is no different than many other jurisdictions have experienced. King County has a twenty-year plan to rebuild or replace all six of their transfer stations. The cities of Tacoma and Seattle have built new transfers stations to replace the antiquated facilities that have been operating for over 50 years. Metro is examining alternatives for expanding the transfer station system while adding new programs to manage food waste. As presented in this Phase 1 report, the County has several options for making these investments for continuing to provide quality services to residences and businesses.

6.6 Financial Analysis for Capital Improvements

The Phase 1 Report evaluates the options for making the necessary investments to modernize the County system. In the course of preparing the Phase 1 report, the JRMA consultant team completed a review of the total cost of operating the solid waste system for the year ending in 2019. The financial review was conducted within the guidelines provided for in the contract between the County and CRC (Waste Connections of Washington). The analysis provides information that will enable the County to evaluate impacts on rates for making capital improvements.

The following table shows the estimated cost to operate the solid waste system in 2020 as projected from the 2019 cost of services review. Total revenues under the current rates are $37M based on the incoming waste received for 2020. Expenses unrelated to the transfer station operations are $20.5M. These expenses include County and city fees, Washington State refuse taxes, and disposal cost. The transfer station operational cost is $9.8M, and the net revenue generated from current rates is $7.9M.

Description	Cost per Ton	Waste Tons	Total Cost
Revenue	$103.33	361,038	$37,306,048
Less Non Related TS Costs	($31.63)	361,038	$(11,419,629)
Transfer Station Operational Costs	$49.70	361,038	$17,943,584
Net Income	$22.00	361,038	$7,942,834

As a percentage of the Transfer Station Operational Cost, Net income is 44% ($22.00 / $49.70). There are two primary reasons for the high margin. First, the County and CRC agreed to a phased-in reduction of the MRF subsidy without a proportional decrease in the waste disposal fee. Prior to 2017, the MRF was subsidized by the profitability of the transfer system. Second, through the life of the contract, CRC has depreciated the capital investments of the transfer station system. The last material investments made by CRC were in 2009 (Washougal Transfer Station) and 2019 (West Van compactor). It appears from the financial information that most of the capital expenditures are fully depreciated. Typically, capital depreciation is planned to reach zero near the end of an operational contract.

It is important to note the unit cost to operate the County stations is not necessarily comparable to other transfer stations. This is because the level of services provided and the operations of each transfer station themselves can vary significantly. For instance, Metro contracts out its transfer station operations. However, Metro operates the scales/gatehouse at each facility. In addition, Metro owns the facilities and is responsible for making most repairs. As such, they have established a renewal and replacement account to fund these repairs and replace equipment. CRC is a full-service vendor that manages all of the activities and functions associated with the operations of all three facilities and making repairs.

6.6.1 Analysis of Capital Needs

An operating margin of 15% was used to evaluate the revenues in excess of the operations now being generated. This assumes no additional capital investments of the facilities and that all remaining assets have been fully depreciated. Assuming a 15% operating margin would result in

net income of $7.46 per ton ($49.70 x 15%) or approximately $2.7M. The current rates generate $71.70 ($49.70 + $22.00) per ton. Under the 15% operating margin assumption, the total compensation to operate all three transfer stations is calculated at $57.16 per ton ($49.70 + $7.46 per ton). Therefore, $14.54 per ton or $5.2M annually could be utilized to fund capital improvements. Over ten years, this would generate over $50M.

The capital needs identified in this Phase 1 report are estimated to be between $25M and $50M. The conclusion is that current rates do generate revenue that could be applied to fund future capital improvements. How these monies are managed has not been defined other than what is spelled out in the current contract. The County has notified CRC of its intent to extend the operations contract for another five years. The County retains the option to purchase the transfer station system by the end of 2026. What system improvements should be made and how they will be funded has not been decided. However, this analysis indicates that the current rates appear to generate a significant portion of the funds necessary to make future improvements.

Chapter 7

Feasibility Study: Materials Recovery Facility Options

7.1 Introduction and Purpose

The County and each of the cities offer a range of recycling services to residences and businesses. The primary service is the collection of commingled recyclable materials from single-family and multi-family residences. The materials collected are taken to the West Van MRF to be processed for delivery to markets. Materials that have no market value and any contaminated materials are separated as residue and transported for disposal at a landfill.

The MRF is comprised of a processing system which utilizes mechanical equipment (e.g., conveyors, screens, magnets, etc.) and manual labor to separate recyclable materials. The JRMA team, working with WCW, conducted a full assessment of the MRF system and concluded that significant improvements are needed to improve the system performance, however, a total redesign and replacement of the existing MRF system is the best approach for meeting the long-term recyclables processing needs of the County.

There are several decisions to be made regarding the type of improvements needed at the West Van MRF as well as the possibility of installing new equipment at a new, more central location. This feasibility report addresses these two scenarios.

7.2 Background / Existing Conditions

In 1992 the West Vancouver MRF and Transfer Station (West Van) was the first of three solid waste facilities put into service to receive garbage from commercial collection trucks and self-haul customers The facility is owned and operated by CRC and serves the majority of the City of Vancouver and its' central business district. It is the oldest of the three transfer stations operating in the County.

Clark County and the cities began collecting recyclable materials from residential customers in the early 1990s. CRC installed equipment at the West Van facility to process all of the County's recyclables generated from these collection services. As collection programs expanded throughout the County more materials were collected. In 2008 WCW made improvements in the processing system by installing additional equipment. While minor changes in the system have occurred over the past few years there have been no significant investments in the system since 2008.

7.3 Current Collection System

Residential recyclables collection service varies throughout the County from weekly to everyother week collection. Weekly service is provided in the cities of Battle Ground, Camas, Ridgefield, and Washougal as well as in the unincorporated urbanized service areas of the County. Every other week service is provided in Vancouver, La Center, and Yacolt and in the unincorporated rural County.

In 2009, the County transitioned to a roll cart-based collection system for both single-family and multi-family residences. The carts are for commingled paper, plastic, and metal recyclables with glass bottles collected separately in a bin next to the cart. For single-family residences only, used motor oil, antifreeze, and household batteries are also collected next to or on top of the cart. These items are not collected at multi-family complexes; otherwise, materials collected, and sorting requirements are the same for all residents. The multi-family collection service program provides each complex with 60 or 90-gallon collection carts or containers. Multi-family complexes provide signage for the central collection areas and in-home containers for storing and transporting materials to the central collection areas. Multi-family collection schedules are set to meet the requirements of each complex.

Residents may also deliver their recyclable materials to public drop-off centers at transfer stations, private buy-back metals, or other drop-off locations. Public drop off sites include:

- CRC's three public transfer stations
- Earth Friendly Recycling (Drop off for e-waste and appliances)

All commingled and source-separated materials are delivered to the West Van MRF for processing. Currently, the cities and the County generate about 60,000 TPY of commingled and source-separated recyclable materials primarily from residential customers.

7.4 Updating Commingled Collection Programs

Market conditions for recycled materials have changed significantly since the China Sword was instituted in 2018. Basically, China issued much stricter requirements to reduce contamination in recyclables that for all practical purposes could not be attained. This led to a glut of recycled materials causing prices to fall. At the same time in the U.S., the Institute of Scrap Recycle Industries (ISRI) stepped up enforcement of quality standards for the percentage of prohibitive (i.e., contaminants) for both recycled fiber and plastics. To meet the higher specification and reduce contamination, most MRFs' operating in the U.S. needed to reduce throughput rates by slowing conveyors to enable sorters more opportunities to pick recyclable materials and/or remove contaminants. Some MRFs' have also made investments to install advanced technologies such as optical sorters and robotics to produce higher quality materials.

The other consequence of these conditions is the need for jurisdictions to modify collection programs to restrict certain materials from being placed in recycling containers. Whereas markets for PETE, HDPE, and polypropylene (PP) plastic containers remain strong most other plastics have virtually no outlet. The new challenge is to re-educate residences and businesses to eliminate discarding certain items with their recycled materials.

It goes beyond the scope of this feasibility study to evaluate the collection programs and materials currently listed. However, as Clark County and cities move forward with evaluating the feasibility of purchasing a new MRF processing system it is also important to examine the current list of materials being recycled and update the program to reduce potential contamination. Such actions may reduce the total amount recycled but it will result in a lower cost to process materials and increase the market value of those materials recovered.

7.5 Current MRF Processing and Material Recovery

Recyclable materials received through the curbside and multi-family collection programs are processed at the West Van MRF and recovered materials (i.e., commodities) are marketed and a portion of the revenue generated from the sale of these materials is returned to the County, the City of Vancouver, and the contract hauler. The cities of Camas, Ridgefield, and Washougal have contracts in places that do not include provisions for revenue sharing of recovered materials. Recycling collection services are supported by County, city, and private collector promotion and education efforts.

CRC's transfer and disposal contract with the County requires the company to recover and recycle a minimum of 10% of the incoming disposal stream. CRC meets its minimum annual recycling requirement by recovering materials from selected loads on the tipping floor. Most recovery is wood and metal, pulled from loose drop-box or self-haul loads. Very little is recovered from compacted loads of mixed waste, due to contamination and operational difficulties. Source-separated materials, delivered to CRC drop-off recycling facilities by self- haulers, are counted toward the minimum annual recycling requirement; however, materials recovered through CRC's source-separated recycling collection services and materials collected by County and city recycling collection contractors are not included.

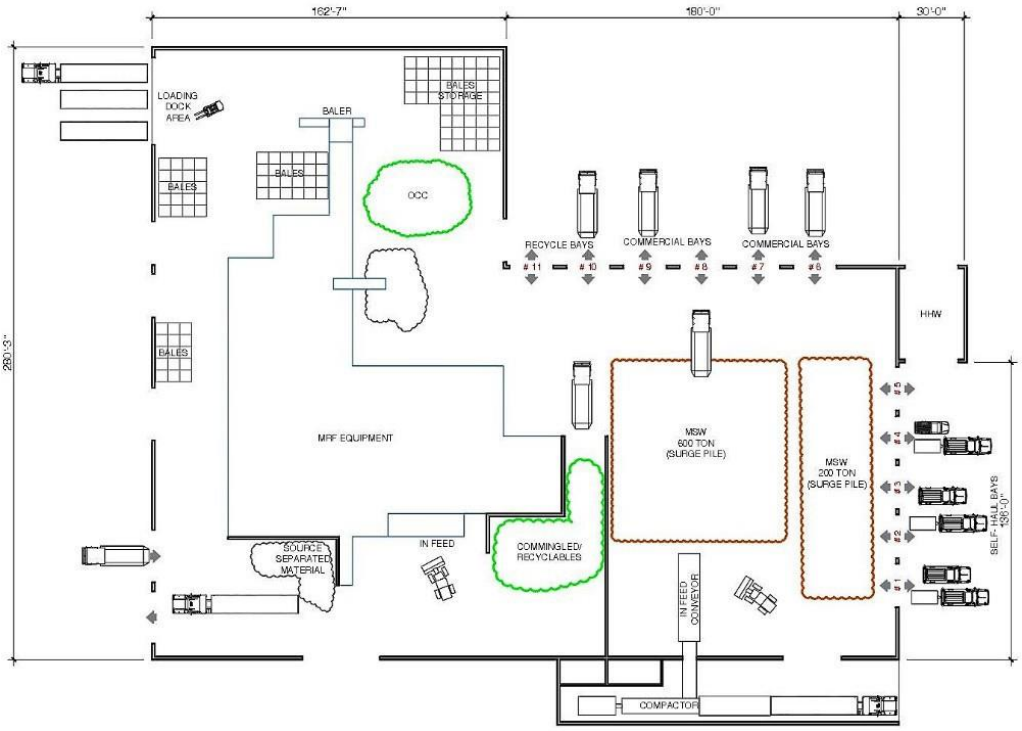
Annually, CRC conducts an allocation study by sampling select loads of materials received by various sources, such as residential and multi-family customers. The sampling procedures were developed by Green Solutions, an independent company. The loads are run over the process line to establish the number of recoverable materials from each source. Based on these sampling events, the percentage of revenue from recovered material for each jurisdiction can be calculated. This information provides useful data to determine the composition of the commingled materials collected but does not represent actual recovery data for recyclables materials as it represents only a small sample of materials processed. CRC also conducts a study of the residue to establish the composition of the material being disposed of. This is the only composition data available and was used to complete the feasibility analysis. See Section 7.7 of this report for more details on material composition.

7.6 Existing MRF Operations

7.6.1 – MRF Receiving Areas

The West Van MRF is located on a 21+ acre site off Old Lower River Road at the Port of Vancouver. The property includes a large 85,000 sf pre-engineered metal building (PEMB) that receives waste from both self-haul customers and WCW collection trucks from residential and commercial accounts. The floor plan of the West Van Transfer Station and MRF is shown in Figure 7.1 on the following page. Of the total building, approximately 35% is dedicated to transfer operations. The remaining 65%, or roughly 55,000 sf, is dedicated to the MRF operations. About half of the space is occupied by the processing equipment with the remaining space used for receiving materials and storing bales of recovered materials to be shipped to markets. Bales are also stored under a canopy located in the lower yard. This is the only MRF operating in Clark County.

Figure 7.1: Existing West Van Floor Plan



Recycled materials are collected and delivered to the MRF primarily on Monday-Friday with only a few vehicles on Saturday. On average 63 collection trucks arrive over an 8-hour period as shown inTable 7.1 below. CRC dedicates Stalls 10 and 11 on the east side of the building for recycling collection trucks to unload.

Table 7.1: West Van MRF Average Weekly Inbound Traffic

Source	**Mon.**	**Tues.**	**Wed.**	**Thurs.**	**Friday**	**Sat.**	**Grand Total**
Commercial Recycling	13	13	13	14	13	1	67
Residential Single Stream	42	44	47	44	41	3	221
OCC (WCI and Self Haul)	6	4	6	6	4	1	27
Total Inbound Collection Vehicles Trucks.	**61**	**61**	**66**	**64**	**58**	**5**	**315**

Table 7.2 below shows the amount of materials received in 2019 on a weekly basis. On average the MRF receives about 230 TPD. This includes commingled materials (single stream) from residential customers and source-separated glass.

Table 7.2: West Van Average Weekly Inbound Tons

Source	Mon.	Tues.	Wed.	Thurs.	Friday	Sat.	Grand Total
Commercial Recycling	59	60	61	65	60	5	309
Residential Sigle Stream	159	152	160	153	150	14	787
OCC (WCI and Self Haul)	7	7	11	15	7	1	48
Total Inbound Received:	**225**	**219**	**232**	**233**	**217**	**20**	**1,144**

Over the past 20 years, CRC has adapted and reconfigured the equipment needed to process the recycled materials including modifying the existing physical structures and available space to manage these materials. The tip floor space does provide a dedicated area for collection trucks to unload commingled materials in Bays 10 and 11. Also, they have created areas where source-separated materials can be unloaded to provide access to the conveyors to directly feed balers. But the tip floor is very limited to handle surges and or temporarily store materials during shutdowns of the process line. For instance, currently, commingled materials are received at a rate of 30+ TPH. However, the current equipment line processes materials on average of 15 TPH that is slower than the original design. Operating at the lower rate is necessary to produce bales that meet current market conditions. The MRF does operate over two 8 hour shifts so materials must be temporarily stored. When the process line incurs extended interruptions or shutdowns that sometimes occur with MRF equipment, additional space to store materials is needed. As the recycling collection programs are expanded and with the expected growth in the County there is insufficient space to manage these materials. This can be rectified by installing a more efficient processing system that uses less space or possibly moving to a new location with a dedicated building to house the MRF processing equipment.

7.6.2 – MRF Processing Equipment

In 2008 the initial processing system was upgraded and reconfigured to fit within the existing area without requiring a building expansion. These improvements resulted in enhanced throughput and recovery rates, but the configuration is not ideal for processing the amount of materials being received currently. The following text is an excerpt was taken from the Equipment Assessment Report (Appendix E) prepared by Swordfish Consulting Services, an independent MRF expert, that summarizes the condition and useful life of the existing equipment. CRC has recently installed several robotics units at select positions on the processing line to improve the quality of recovered materials and reduces the number of sorters needed to operate thus reducing labor costs.

Current System and Useful Life

The MRF processing system, though fully functional and in good operating condition, is several generations behind current technology and, by comparison, relatively inefficient. The system's current reduced production run rates are directly correlated to the huge material composition

changes realized over the past 10 years and the current technology employed to process it.

While newspaper generation continues its decline, cardboard composition has dramatically increased, challenging most traditional paper screening machines. In the short term (two-four years), the operator should consider continuing its current practice of targeted component replacements. The cardboard screen is scheduled for replacement soon. We recommend the replacement of other potential targeted components as noted in the condition report. In particular, we recommend replacing those components that can be easily installed and then removed for use in a future new facility as applicable. Robotics, ballistic screens, and optical sorters in that order are fairly easy to integrate into an existing system and are usually easy to plug and play into a new system at a later date. **Long term, considering the dramatic change in material composition, age of the existing system, the County's progressive approach to recycling, and the prospects for expanding the environmental programs offered to residents and businesses, the total redesign and replacement of the existing MRF system will yield greater environmental and financial benefits than retrofitting the existing system.**

Important to note is that CRC has a good maintenance program for keeping this system operating with an up-time performance level of about 90%.

The original design throughput of the system was 25-30 tons per run hour. The reduction in original equipment manufacturer (OEM) run rates to approximately 15 TPH is due to the dramatic change in quality standards related to all paper products. This has forced the operating team to reduce the system run rate by 30%. Thus, to process the current inbound recycling streams the plant is operating between 13-16 hours per day or two shifts. Shift 1 processes residential single stream (3,410 per month) at 20 TPH in 8 hours over an average of 22 days per month. During shift 1, any commercial direct bale materials received are processed in real-time. Shift 2 processes any remaining residential stream plus commercial stream that requires partial system processing and completes baling direct bale materials. Each shift is 8 hours with one hour for breaks. The processing time does allow for process interruptions typical in recycling process systems.

Another factor impacting the MRF operations is the current market conditions. Since China initiated the "Sword" that restricted imports of recycled paper and plastics, MRF operators have to meet more stringent markets conditions. Both domestic and international markets advanced stricter specifications for recycled paper requiring MRFs to reduce contamination levels in baled materials. To reduce contamination and meet markets conditions more sort labor is needed, and the process lines needed to run at a slower rate. Even so, there are still markets for recycled materials, but prices have been greatly reduced due to oversupply.

The summary of current operating parameters of the MRF are as follows.

Residential Commingled/Commercial Received (2019):	**230 TPD**
Current Throughput (Average):	**15 TPH**
MRF Operates:	**Two- 8 hr. shifts +**
Sorting labor including clean-up staff (subcontracted)	**52-56 Employees**

The subcontractor provides sort labor, clean-up staff, and maintenance support staff plus forklift and baler operators. CRC employees include managers, mechanics, and additional equipment operators to support operations.

The 15 TPH throughout requires more time to process materials, thus more labor and increased cost. To process the 200 plus tons per day of commingled and source-separated materials requires 16 to 20 hours per day over two shifts plus some overtime. Equipment cleaning and maintenance is performed. These parameters are not likely to change given the current market conditions. In comparison, modern processing systems employ more advanced equipment that can process commingled recyclables from residential customers at a rate of 30-35 TPH and process the same materials in a single 8-hour shift. In addition, advanced equipment such as air/density separation, optical sorters, and robotics are more efficient and require much less labor. The advanced processing equipment lines are also less expensive to operate and are necessary to improve the quality of the baled materials to meet market specifications.

The conditions assessment details several suggested improvements mostly related to adding certain equipment to enhance the process line flow and yield/recovery capabilities. This includes the list of the following equipment improvements.

1. Add optics on the plastics line to increase yield and decrease residue.
2. Install robotics to select locations to improve quality and reduce labor.
3. Replace vibratory screens with ballistics screens to improve material flow and related recovery.
4. Enhance eddy current separator.
5. Install large drum feeder at the infeed to reduce surging and improve material flow and related recovery.
6. Add paper optical to increase paper quality and decrease labor cost per ton.

The estimated cost of installing all of this equipment is between $4M - $5M. CRC is already planning to make some of these improvements. Others may be considered on a case-by-case basis with the intent to incorporate them into a new system. However, longer-term it will be beneficial to install a new system that will result in decreased labor per ton, increase throughput per hour and improve the quality and quantity of materials recovered. In the short-term, modest equipment and sorter process investments can be made that will derive immediate improvements to operational results.

7.7 Composition of Recycled Materials

Accurate data that depicts the actual composition of the commingled materials processed over the current MRF system is important for completing the feasibility study of replacing the existing system. The County uses data based on waste composition audits generated annually to allocate revenue from the sale of recovered materials and the analysis of the residual materials conveyed off the end of the process line that is landfilled. This data can be combined to providea fairly accurate picture of the composition of the commingled recyclable materials received at the existing MRF and determine how the existing MRF is performing.

The data from the composition analysis of commingled materials collected from single-family and multi-family residences in 2020 is shown in Table 7.3 on the next page. It lists the percentage of each material that is collected on the route and then delivered for processing. It is adjusted to remove glass since it is collected in separate containers. The breakdown of the number of tons for each material is calculated by multiplying the percentage by the total annual tons received. This table assumes the MRF processed 54,200 TPY which represents the average amount for the last two years.

Table 7.3: Existing MRF Composition

Materials	%	Materials Recovered (TPY)
OCC (cardboard)	20.4%	11,057
Mix Paper	13.0%	7,046
ONP (newspaper)	24.0%	13,008
ALUM (aluminum)	1.6%	867
TIN	2.2%	1,192
MISC METALS	0.0%	0
PET plastic	1.5%	813
HDPE plastic	1.4%	759
Colored HDPE plastic	1.6%	867
Other Plastics	1.0%	542
MCDB (Out of Cty. Drop Box)	0.3%	163
GLASS (Plate)	0.0%	0
GLASS	0.0%	0
OIL/SCRAP	0.0%	0
REJECT	33.0%	17,886
Total	**100.0%**	**54,200**

As shown approximately 33% of all materials processed at the MRF are rejects or residue that is landfilled each year. Based on annual waste composition reports most of the residue is comprised of contaminated materials or those that do not have markets. However, studies conducted by the County have identified that a percentage of residue represents marketable materials such as OCC, clean paper, and plastic containers which all have some commodity value. These losses can be attributed to issues previously summarized in this report.Table 7.4 shows the composition analysis of the residual materials from the existing MRF.

Table 7.4: Composition of Residue

Materials	%	Residue Quantities (33%)
OCC (cardboard)	6.00%	1020
Mixed Paper	34.50%	5865
ONP (newspaper)	7.00%	1190
ALUM (aluminum)	0.06%	76.0
TIN	0.02%	3
MISC METALS	2.00%	340
PET plastic	4.00%	680
HDPE plastic	8.00%	1360
Colored HDPE plastic		0
Other Plastics	15.00%	2550
MCDB		0
GLASS	4.00%	680
GLASS PLANT		0
OIL/SCRAP		0
REJECT	19.40%	3298
Total Sample	***100%***	***17,062***

The data is a result of annual studies performed by Green Solutions Inc., an independent consulting firm. It indicates that there is an appreciable amount of marketable materials contained in the residue that could be recovered. This is despite efforts by CRC to maximize recovery by slowing down the process line and providing additional run time and labor to sort. Further analysis of how much could be recovered by a new MRF will be evaluated.

7.8 Financial Review of Existing MRF Operations

7.8.1 – Cost to Operate Existing MRF

CRC has reported the MRF operating cost for the period of July 2019 to June 2020 to be nearly $6.9 million/year as detailed in Table 7.5. This figure includes all expenses required to process all recycled materials collected within the County. Depending on the amountof material processed and the throughput rate the cost to operate on a per ton basis will vary slightly. The average unit cost to operate over the past few years is approximately $127 per ton. The total cost is comprised of both direct and indirect expenses as listed below.

- Direct Operating Expenses – Includes labor for sorting and maintenance (subcontracted to staffing company), supplies, parts and services, utilities, licenses and fees, and depreciation and interest on equipment.
- Indirect Expenses – CRC overhead and profit, advertising/public education, management, and supervisory staff, and miscellaneous expenses.
- Transport and disposal expenses – represents expenses for disposal of the residue from processing commingled recyclables.

Table 7.5: Summary of MRF Annual Operating Cost

Direct Operating Expenses		
Contract / Direct Labor (Including benefits)	$3,597,000	52.1%
Other Expenses (supplies, parts, utilities,etc.)	$1,002,000	14.5%
Depreciation / Interest (Current System)	$784,000	11.4%
Subtotal Direct:	**$5,379,000**	**78.0%**
Indirect Operating Expenses		
Management/ Supervisory	$235,000	
Other Expenses	$86,000	
WCW Overhead and Profit	$381,000	
Subtotal Indirect:	**$702,000**	**10.2%**
Transport + Disposal (Residue)	**$813,000**	**11.8%**
Total:	***$6,894,000***	***100%***

As shown more than 50% of the cost to operate the MRF is attributed to direct labor expenses

(includes overhead and profit) to sort materials and support maintenance of equipment. The system requires more than 50 sort laborers to process materials over two shifts and routinely requires overtime. This work is performed by a subcontractor with supervision by CRC employees. This labor model is used in many MRF operations throughout the country as the contractor is responsible for hiring, firing, and the training of the sorting labor and other operational activities as agreed to by CRC. The operating expenses were prepared by our independent financial consultant working with CRC.

Revenue from Sales of Recovered Materials

Revenues from the sale of recovered materials help offset the cost to operate the MRF. This includes the sale of fiber materials such as old, cardboard, and clean newspaper and mixed paper, and plastic PETE and HDPE containers. Other materials recovered include ferrous metals and aluminum cans. Each of the commodities can be sold and the prices vary. In past years, the combined average price per ton ranged anywhere from $100 to as much as $160 or more per ton. But in 2018 China restricted imports of recycled commodities resulting in a reduced demand and leading to oversupply in the US marketplace. Over the past few years,sales of the commodities recovered from the West Van MRF were $46 per ton shown as summarized in Table 7.6.

Table 7.6: Summary of Revenue

Annual Tons Processed	54,200*
Recovered Material (68%)	36,900
Total Revenue	**$1,700,000**
Revenue /Ton Recovered	**$46.00**

*Average commingled material processed over past two years (i.e., 2019-2020)

As stated previously, the revenue generated from the sale of materials is shared by CRC, the County, and certain cities. How the revenue is shared is not addressed in the feasibility study as the primary purpose is to evaluate the feasibility of building a new MRF to recover more materials, reduce cost, and potentially generate more revenue. However, revenues from materials sales have trended upward in the past year. For the first quarter of 2021, it looks like average revenues are steadily growing and average around $75 per ton.

7.8.2 – Summary of Existing System Performance

The independent assessment report concluded the existing system has been well maintained and CRC has in recent years increased run time to achieve maximum performance. A summary of the current system performance is shown in Table 7.7 on the next page.

Table 7.7: Summary of Existing MRF Performance

Existing MRF Performance Metric	West Van MRF
Material Processed (TPY)	52,400
Diversion	67%
Estimated Construction Cost	0
Throughput Rate (Ton/Hr.) (TPH	15
Operating Shifts	2 (16 hrs + OT)
Annual Operations Cost	**$6,900,000**
Estimated Operating $/Ton	**$127**
Estimated Revenue *	$1,700,000

The performance reflects the status of the equipment, which is largely outdated, and the configuration does not promote the most efficient system. The symptom of substandard performance includes the throughput at 15 tph that requires two full shifts and overtime to process while achieving a recovery rate of only 67%. There are two parts for responding to this substandard performance. The first is by installing a new processing system designed to maximize the recovery of marketable materials of the highest quality with an optimal throughput rate that reduces operating costs, primarily by reducing labor costs. A second factor is to generate cleaner materials at the source. This means enhanced promotion and education programs informing customers to keep contaminants out of the recycled cart or bin.

7.9 New Material Recovery System

7.9.1 – MRF Processing Equipment; Advanced Technologies

Over the past 10 years, there have been significant improvements, within the MRF industry in the equipment used to process commingled recyclable materials to maximize productivity and respond to market conditions. These advances are a result of ever-expanding recycling programs nationwide. A new material recovery system for the County should include the latest technologies now used in modern MRFs', several of which are located in California. The system should be designed to achieve optimum efficiency with unit processes designed to maximize recovery of marketable materials while minimizing labor costs. The new system will produce cleaner bales and improve revenue but more importantly, is to reduce contamination of materials at the source. If the County and CRC proceed to invest in the equipment as recommended for the current system, such as advanced screening, optical sorters, and robotics, these unit processes can be utilized in a new system and will offset the future cost for the new system.

The new MRF should be designed by vendors that specialize in providing a turnkey processing system to address local material composition and market conditions. There are several companies that have proven systems and will design an equipment line to meet the performance standards established by the owner.

The following is a description of the features of a new processing system and some of the latest technologies being used throughout the industry. This description is intended to provide an overview of the unit processes and features used in modern MRFs' and their application to process recycled materials in today's market conditions. The ultimate system will be

designed to meet the requirements for processing the County's recycled materials streams considering available volumes and both inbound and outbound material specifications anticipated over the next 10 to15 years.

1. Tipping Floor

The tipping floor should be designed to provide sufficient unloading stalls for tipping and storing materials accounting for interruptions in process time. It may provide space to receive both commingled materials from residential and mixed commercial recycled streams depending on what collection programs are used. In this case, the new system might have two (2) infeed hoppers to feed separate conveyors to the processing line. The tip floor needs to have space for operators to check the pile to ensure that there are no oversized or non-processible items among the recyclables. Operators then load recyclable materials onto an in-ground conveyor belt or an above-ground hopper that feeds the conveyor belt. After loading, a drum feeder is used to ensure equal distribution of material so pre-sorting by sorting staff can be efficiently and effectively handled at high loading times.

Currently, the County generates about 200 tons per day of commingled materials. Considering the growth in the county and expansion of services the tip floor should be able to accept more materials. If constructed this would be the most advanced MRF system in the Pacific Northwest and the County could expect to receive materials from other jurisdictions. This is exactly what happened at the Monterey Regional Waste Management District in Marina, CA when they opened their new MRF in 2018. Also, at the Athens Services MRF located in Sun Valley, CA., the owners agreed to accept materials from the City of Los Angeles residential commingled because of the technology being used. The Sun Valley MRF was the first plant to install artificial intelligence (A.I./robotics) equipment in the country.

Given these conditions, the tip floor should be able to handle a minimum of 400 TPD. This provides some capacity for surges in materials and times when the system is down. Also, a new MRF processing system will have a designed throughput between 30 and 35 TPH.

Assuming a throughput of 30 TPH the system will process about 400 tons per day over two -eight hour shifts operation when accounting for breaks and run time interruptions.

2. Pre-sorting

The commingled recyclables are fed onto a pre-sort platform area; sorters extract materials such as large rigid plastics, metals, film, wood, and other large pieces that impair the performance of the screening systems. The number of sorting stations can be tailored to the specific cycled streams being processed.

3. Screening /Sizing Materials

Screening

The screening process used in today's MRF s' is much more advanced by reducing the downtime attributed to wrapping as well as providing better separation of materials. There are variations to the arrangements of equipment depending on the materials being processed and preferences by certain vendors. But the equipment is much more reliable and adaptable to the composition of today's commingled recycling streams.

The initial screening separates larger pieces of OCC. The more advanced screening technology

uses a wider surface area and screen mechanisms are designed to minimize wrapping of film plastics or items that can hinder screening performance. Secondary screens can be used to separate 2D (fibers) from 3D (containers). Another technique is to use air density separation to achieve similar results. Finally, some system uses polishing screens to further separate fibers.

Fines & Glass Removal

During the initial screening process, smaller material (i.e., less than two inches to three inches in diameter) fall through onto a separate conveyor and are removed from the larger containers and fiber materials. Also, during this process glass bottles are broken and fall through the screen.

The materials referred to as fines are made up of dirt, grit, and some small pieces of plastics and paper. In most cases, the inert fines and glass materials can be used as alternative daily cover at landfills or possibly as clean fill for select uses. Some MRFs include a glass recovery system of markets or alternative uses for the material are available.

4. Fiber (Paper) Sorting and Use of Optics

One of the biggest changes to modern processing lines is the challenge to produce high-quality mixed paper or white ledger. Screening systems are designed to separate 2D and 3D objects, but the fibers contained in commingled streams are smaller and contain much more cardboard largely a result of the so-called “Amazon” effect. New processing systems incorporate optical sorting technology to remove small browns (cardboard) and film plastic that is entwined in the small fiber line. Removing these contaminants is important to make clean high-grade paper bales that have a much higher market value than a mixed paper bale that has little value. Also, both clean film plastic and small browns (cardboard) are marketable materials.

5. Container Sorting

The containers made up of plastics, tin cans, and aluminum cans fall through the screens onto a separate conveyor. The container sorting process utilizes a variety of equipment such as magnets, optical sorters, and eddy currents to further separate the various containers. Note there are many types of plastics that have a market value. PETE (such as water and soda bottles), HPDE (such as milk jugs), and polypropylene (PP) or #5 plastic containers have a fairly high value in the marketplace. Other plastics such as film and rigid plastics can be recycled but the markets as less stable. To maximize revenue, these less valuable plastics must be separated from higher-value plastics and containers. Significant operational efficiency and product quality improvements can be realized through the use of advanced optics and robotics. Also, throughput is increased since these systems can operate at higher conveyor speeds versus those depending on manual labor.

Eddy Current Separator

An eddy current separator utilizes different magnetic field technology to recover aluminum materials. Like the standard magnets, the eddy current separation unit is well developed and because of the value of recycled aluminum, it is a key piece of equipment even in places where bottle bills have been adopted. Some MRFs may use more than one eddy current separator at different locations if needed.

6. Baled Materials/Shipping

Most large-scale MRFs’ will have two baling systems, a two-ram will be used for containers and a single ram for fibers. Having two balers also provides critical redundancy in case one baler is

non-operable. The facility should be designed to allow adequate storage of materials as sometimes market prices that fluctuate daily may cause materials shipments to be delayed. Currently, at West Van, bales are stored inside the building, but space is limited, causing bales to be stored under a canopy located in the lower yard. Sufficient bale storage should be provided to store materials to adapt to market conditions and keep bales clean and dry.

7. Residue Disposal

When processing commingled materials, there is always a residue; materials that are either contaminated or that do not have market value. The amount of residue can vary greatly depending on the jurisdiction. Ideally, the new MRF should be designed to convey the residue directly into transfer trailers or to a surge hopper that discharges into a trailer for transport toa disposal site.

7.9.2 – MRF Processing Equipment and Cost

The estimated cost to install a typical single stream or commingled process line using a turnkey procurements approach is estimated to range from $15M to $18M (2020 $). Estimated costs are based on recent cost proposals for MRF equipment lines designed to process similar commingled materials. These costs are from a turnkey procurement approach which typically includes all costs for engineering, manufacturing, shipping installation, commissioning, and startup of the system. The actual cost will vary based on specific equipment needs and the contractual requirements for performance guarantees and system warranties.

The final equipment system will be designed to process Clark County's recycled streams based on historic material composition data. The decision of how much equipment is installed includes weighing the benefits of added capital cost versus the cost of operations and how much labor is needed. For instance, if the MRF is designed to process 30-40 TPH there will need to be more equipment and therefore added capital cost. If the MRF is designed to process 20 to 30TPH the initial capital cost may be less, but labor cost may be more. Owners and operators need to evaluate these factors to decide what system is best suited for their situation.

For the purposes of this feasibility study, the estimated cost for a new MRF is assumed to be $18M considering the equipment would handle up to 400 TPD. If the system is only handling 200 – 250 TPD the cost may be slightly less at $15M with less equipment needed compared to a larger system. It is also assumed new equipment recommended for the current system is not used in the new system. If some equipment is purchased and installed short-term those units may be reinstalled in a new MRF facility thus reducing the estimated equipment cost.

7.10 MRF Replacement Options

The County and the cities have invested in providing residences and businesses with reliable collection systems and equipment to process recyclable materials. Currently, the system is processing 50,000 to 55,000 TPY. As the collection of recyclable materials expands to more customers and with the expected growth in the County, the number of materials to be processed will increase. The County recycling system must have a reliable and cost-efficient system to process and market materials. WCW can make some capital improvements to the existing processing system to improve performance, but these are stop-gap measures.

Considering the current condition of the existing MRF equipment and relatively high operating costs a new processing system is recommended.

The following are options that may be considered.

1. Transfer commingled recyclables to a MRF located in the Portland or Seattle region
2. Install a new MRF processing system at West Van
3. Build a new MRF with a new processing system preferably at a more central location

7.10.1 – Transfer Commingled Recyclables to MRF located in Portland or Seattle/Tacoma

This option is being discussed for information purposes but is not considered to be a preferred approach. There are five large MRFs operating in the Portland area and several in Seattle /Tacoma area. Several of these MRFs' are independently owned and are not operated by a collection company. Some jurisdictions outside of the Portland Metro area do contract with these MRFs'. This includes Marion County (Salem, OR) and Deschutes County (Bend, OR) in central Oregon. The County or WCW acting on behalf of the County and cities could solicit proposals from these MRFs for processing commingled materials. The primary reason these jurisdictions contract with the MRFs' is due to the fact they do not generate sufficient quantities of commingled materials to support a MRF in their region. Additionally, markets are not local to these locations, and therefore baled materials need to be consolidated to achieve economies in transportation.

However, there are several reasons for Clark County not to pursue this approach.

1. The cost to process commingled materials in the Portland market are similar or perhaps slightly lower, but there will be an additional cost to reload and transport these materials from West Van to the third-party MRF facility.
2. Several MRFs' in Portland are in a similar status to that of the West Van MRF with outdated equipment and, are also faced with making investments to upgrade their processing systems.
3. Unlike some of the outlying areas in Oregon, the County generates sufficient volumes of commingled materials to make it practical to operate a MRF with processing systems using advanced technologies.
4. Contracting the processing to a third party not involved with the collection of materials is less desirable than the option of having them integrated.
5. Revenue sharing with local jurisdictions will likely be compromised or certainly more complicated.

Given these conditions, the option to pursue a third-party contract outside the County is not preferred. However, this could be studied further if the County elects to consider this option.

7.10.2 – Install a New MRF Processing System at West Van

The County could work with CRC to install a new processing line at the existing West VanTransfer Station. A master site plan should be prepared to arrange the equipment line and provide for efficient management of materials. This would include more space for receiving and storing inbound materials and more space to store baled materials. Depending on the results of this master plan, the existing structure may need to be expanded or possibly a new structure located on the property.

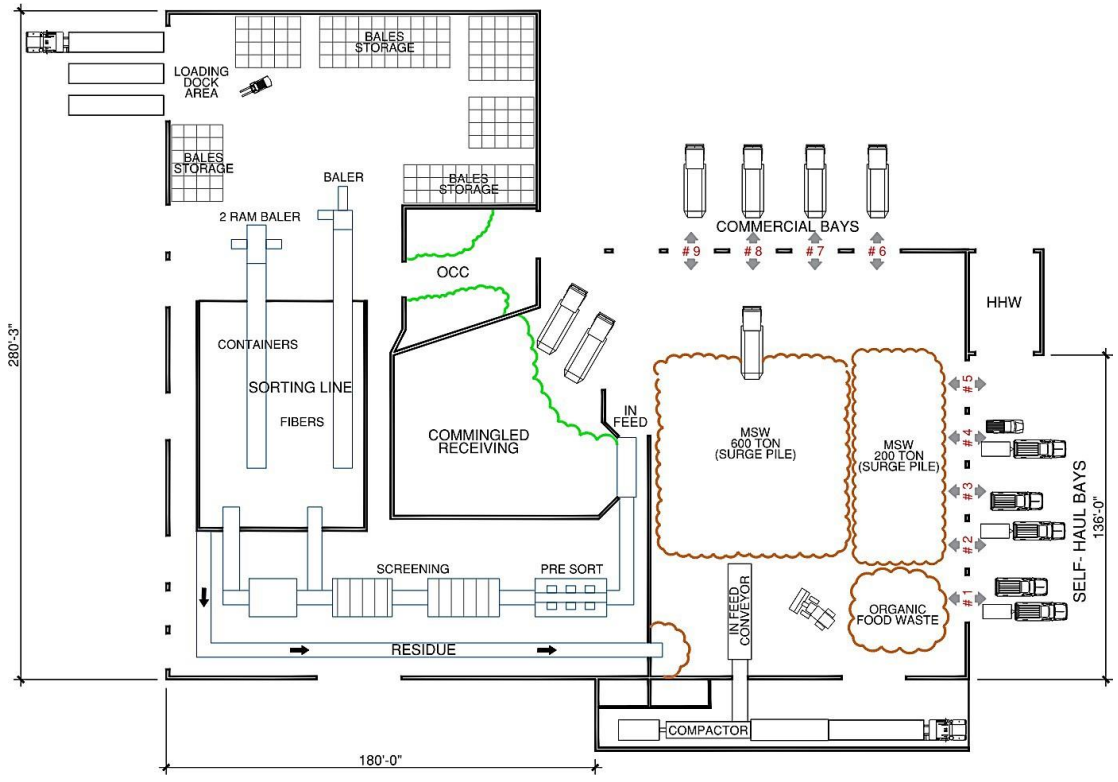
For this analysis, the consultant team developed an equipment arrangement to be installed in the existing structure. This MRF processing system is modeled after a recent project that reflects the space required for a more advanced equipment line. Figure 7.2 shows how this line can be placed into the existing structure and would require minimal changes to the building. This arrangement is conceptual, and more study is needed to determine the most optimal processing system that works well with the existing traffic and circulation patterns.

Other options could include expansion of the existing building and possibly building a new structure in the current wood/green waste yard. However, if it is necessary to build a new structure to house the new MRF this would be less preferable than siting a new facility that is centrally located to the collection system. For this reason, the following is the estimated cost to proceed with a new MRF at West Van assuming minimal improvements.

Option WV – 1: Install New MRF Processing System in the Existing structure.

As shown in Figure 7.2 it appears feasible to install a new processing line in the existing structure. It would require some minor building modifications and installing perhaps as much as 400 feet of push wall to reconfigure the receiving and bale storage areas. Other improvements might include increasing in electrical service to meet system demands and enhancing the mechanical /air handling systems to not only improve ventilation but also to accommodate air handling equipment.

Figure 7.2: MRF Replacement West Van – Option 1



Other improvements include enhancing natural lighting, roof repairs, foundations for floor pits, and floor repairs. The assumption is that the entire new processing system would be installed at cost of $15M assuming the current materials or roughly 250 TPD. If the existing systemadded new equipment as recommended in the MRF assessment report these units may be incorporated into the new system and perhaps may reduce the cost.

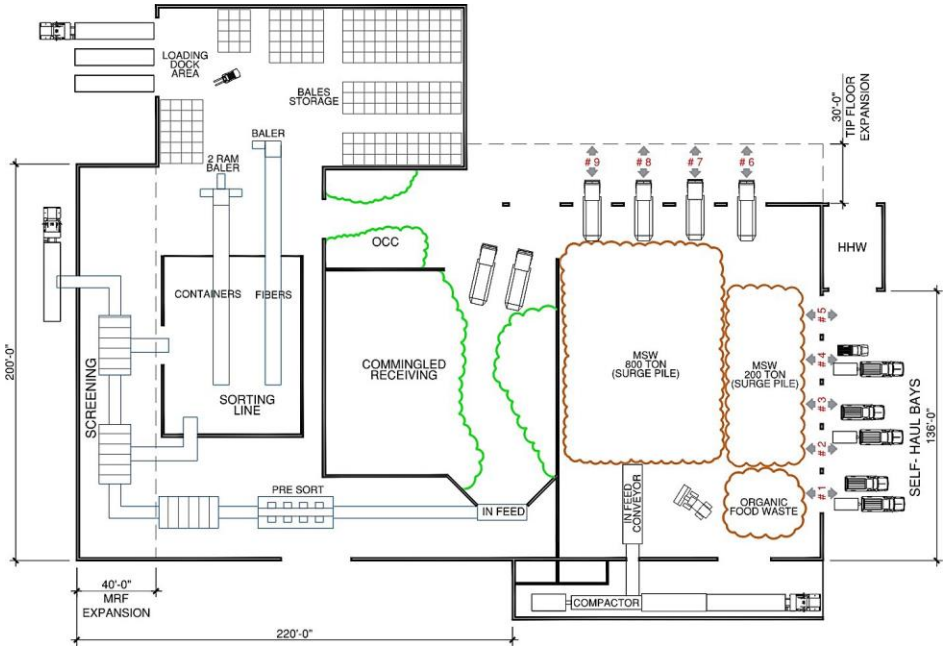
Estimated Construction cost for MRF Retrofit	$4,000,000
New Processing System	$15,000,000
Estimated Capital Cost – Option WV-1	$19,000,000

The new system is assumed to process materials at 30 TPH on average. As such the equipment line would be capable of processing all of the County's estimated 250 TPD in a single shift using 18 sorters including some labor associated with cleaning. It would be desirable to secure additional recycled materials from other jurisdictions if possible. With the current markets that require much cleaner bales, many jurisdictions seek to have materials processed at MRFs that use advanced technologies. This has been our experience at several of the new MRFs on the west coast.

Option WV – 2: Install new MRF System and Expand Structure

Assuming the new MRF process line requires additional space for storing bales or other purposes, the existing structure might be expanded. This improvement might include adding a building to the east side where trucks unload. Expanding the building provides more space for tipping and storing incoming materials. A second approach could be to expand the north side to allow more space to install the equipment line. This possibly would free up space on the receiving floor and provide more storage for bales. A concept for expanding the existing structure is shown in Figure 7.3.

Figure 7.3: MRF Replacement West Van – Option 2



As shown the existing building could be expanded by as much as 13,500 sf. This increases the footprint for the MRF operations to about 70,000 sf.

The estimated construction cost would be the same as option WV-1 plus the cost to construct the building expansions.

Retrofit Existing Building	$4,000,000
Building Expansion – 13,500 sf	$2,000,000
Total Building	$6,000,000
New Processing System	$18,000,000
Estimated Capital Cost – Option WV- 2	$24,000,000

This system would be capable of processing 400 TPD over two shifts requiring an estimated 36 sorters including labor for cleaning equipment. The need to expand the existing structure would be evaluated further but may be desirable particularly if WCW is able to import materials from another jurisdiction.

7.10.3 – Summary of West Van MRF Options

A summary of the cost and system performance is shown in Table 7.8. The new system will be capable of processing all of the County's materials in a single shift. The reduced run time along with the reduction in sorting labor provides a much lower operating cost of about $105 per ton compared to the current cost of $127 per ton. If additional recycled materials were imported and run over a second shift the operating expenses are estimated to be $82 per ton. This represents the gross operating costs and does not include revenue from the sale of materials.

Table 7.8: West Van MRF Cost and Performance

Performance Metrics	WV-1 New Equipmentat West Van	WV-2 New Equipment and Expansion at West Van
Material Processed (TPY)	52,400	100,000
Diversion	80%	80%
Estimated Capital Cost	$4,000,000	$6,000,000
Throughput Rate (Tons/Hr.) (TPH)	30	30
Operating Shifts	1 (8 hrs.)	2 (16 hrs.)
Equipment Cost	$15,000,000	$18,000,000
Annual Operations Cost	$5,600,000	$8,200,000
Estimated Operating $/ ton	$102	$82
Estimated Revenue *	$2,200,000	$4,000,000

*Revenue estimates are based on the sale of materials at the blended rate of $46 per ton recovered.

The recovery rate is estimated to increase from 67% to 80% based on the current composition of materials. This could be higher if promotion and education programs result in lower contamination from customers at the source. This is based on recovering more materials that are reportedly contained in the residue from the current system. It should be noted that many modern MRF systems have seen recovery rates of 90% or more in pre–China National Sword markets. However, with the current market situation, certain materials such as number 3-7 plastics have no value, and mixed paper not meeting specifications have limited outlets.

Revenues associated with these options are expected to increase as a result of recovering more materials based on the residue studies completed for the County by Green Solutions. Using the current blended rate of $46 per ton of materials sold, the revenue is estimated to increase from $1.7M to $2.2M or about 30% for the same amount of materials processed.

Installing a new process system at West Van would provide the lowest cost for processing the County's recycled materials. Using the existing complex would eliminate the need to purchase a new site and build a new building to house the equipment. At the same time, continuing to process materials at West Van may not be the lowest regional system cost. Collection vehicles need to travel from distant urban areas to unload at West Van and often time return to complete a second route. Some materials are received at CTR and transported to West Van in larger trailers. An analysis of the impacts of building a more centralized MRF facility is discussed in the following Options.

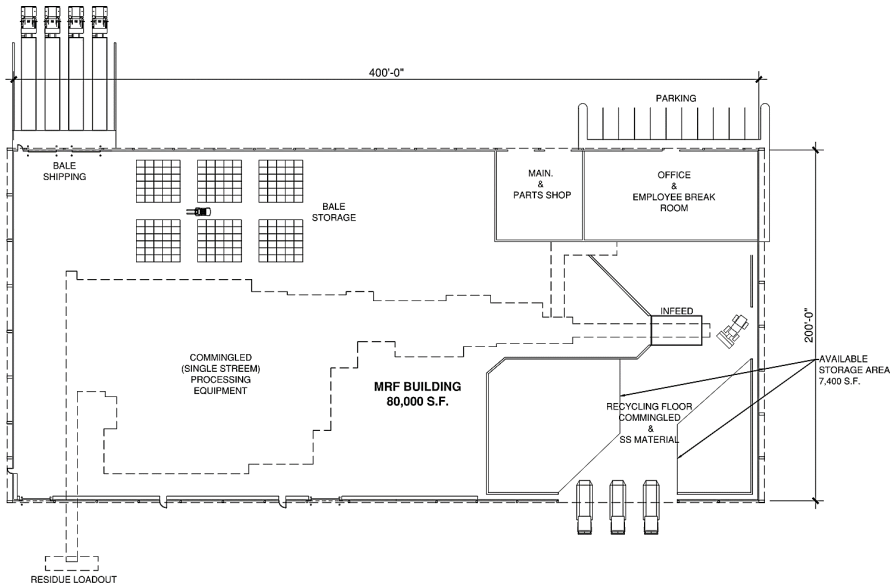
7.10.4 – Site a MRF at a New Central location

The third option for the County is to build a new MRF at a new location. The primary motivation to relocate the MRF is to reduce the overall cost of collection from residential routes. With a majority of the population located east of I-5 and north of Highway14 collection trucks must travel through the City of Vancouver to the West Van facility to unload and then return back to the collection routes adding 6 to 7 miles or more to each trip. A more central location would reduce the distance but more importantly the time to travel to the existing MRF.

The new MRF would require a parcel of 7 to 10 acres preferably located with direct access off an arterial or main collector road. MRF's are typically viewed as more compatible to commercial or light industrially zoned parcels since it receives recyclable materials and not municipal solid waste. The facility would be fully enclosed and operates more like a distribution center.

For purpose of this study, a generic building plan was prepared to show a typical configuration (Figure 7.4).

Figure 7.4: MRF Replacement – New Site



The main MRF building may be approximately 80,000 sf. All operations would be inside a building, including the receipt and handling of collection vehicles and the processing of materials. A loading dock would provide space to ship bales to markets and should be sized to avoid materials from being stored outdoors and exposed to elements of the weather.

The estimated construction cost for the MRF would be approximately $25M. The cost of the equipment would range from $15M to $18M depending on the amount of materials processed as that proposed in the two West Van MRF Options. The total cost is assumed to range from $40M to $43M (2020 $). The cost of operating the new MRF is expected to be the same asin the previous options. However, as mentioned if the suitable site is located more central to where materials are generated there could be cost savings attributed to the collection services.

Table 7.9 shows the comparison of the cost to operate a MRF considering building a MRF at a new location. The gross cost to operate the MRF considering the current recycled stream of 250 tons per day is $133 per ton. Although operating costs would be less than the current operation, the capital cost to build a new building would result in a slightly higher total cost to operate.

However, the amount of revenue would increase due to the increase in materials recovered from the new processing system.

Table 7.9: New MRF Performance

Performance Metrics	N-1 - New MRF at New location	N-2- New MRF w/Imported Materials
Material Processed (TPY)	52,400	100,000
Diversion	80%	80%
Estimated Construction Cost	$25,000,000	$25,000,000
Throughput Rate (tph)	30	30
Operating Shifts	1 (8 hrs.)	2 (16 hrs.)
Equipment Cost	$15,000,000	$18,000,000
Annual Operations Cost	$7,200,000	$9,700,000
Estimated Operating Cost / Ton	$133	$97
Estimated Annual Revenue*	$2,200,000	$4,000,000

*Revenue estimates are based on the sale of materials at the blended rate of $46 per ton recovered.

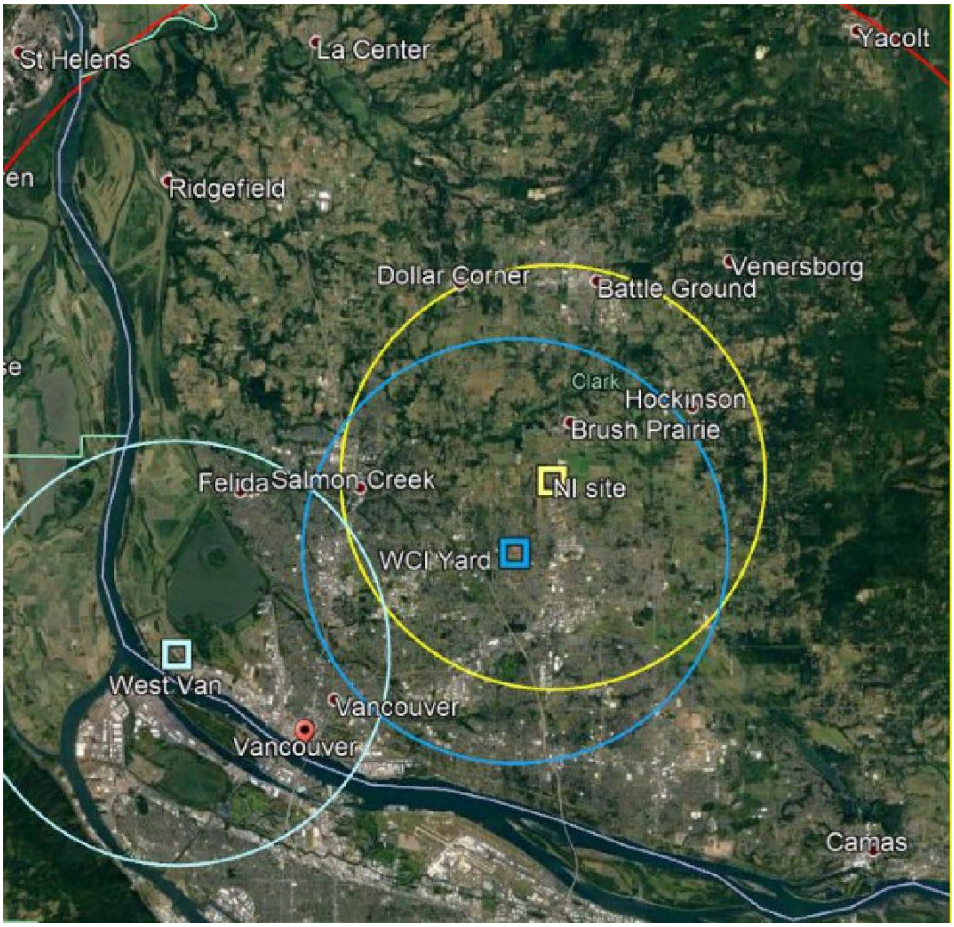
However, if the County and the operator were to process materials from other jurisdictions or 400 tons per day, then the total cost to operate would be about $97 per ton. The system wouldgenerate much more revenue some of which may be shared with the participating jurisdictions.The system would provide benefits to the County by providing a lower unit cost to operate.

7.11 Impacts on Collection Cost of Relocating MRF

Installing a new processing system at West Van would be more expedient and would require less capital than relocating and constructing a new building. However, if a new MRF could be sited at a location more central to residential customers and closer to the hauling yard the total cost of transportation will be reduced. In addition, as reported in the County's Growth Management Plan a larger percentage of the future population increase is expected to occur in the central and northern portions of the County.

To evaluate the impact of relocating the MRF, the JRMA team selected two sites near the WCW's collection yard on 94th Ave. As indicated on the map of the central County, (Figure 7.5) the NI site (yellow) and WCI Yard site (blue) are within four miles or within a six-minute drive time to the collection yard. These sites are not being promoted for building a new facility but represent industrial properties that meet the locational criteria to illustrate the potential transportation cost savings of relocating the MRF. In comparison, the drive time from the collection yard to West Van is 8 miles or about 15 minutes.

Figure 7.5 Central County Map



Currently, trucks collecting commingled recyclables make 14,209 trips per year from their routes to the West Van MRF each year. By 2040 considering the increase in population, there will be an estimated 19,000 trips each year. Most collection trucks make only one trip per day, but at least 21% of these trucks make two trips each day. This number may increase to almost 30% or more in order to service future growth.

Bell and Associates completed a transportation cost analysis considering the average drive time from the collection routes to the West Van MRF and the drive time back to the WCW collection yard on 94th Ave. For those collection trucks having to run two routes each day the drive times or miles were twice as much. The cost per mile of operating a collection truck is based on data provided by WCW. Only the drive time and distance to transport materials to the MRF and back to the collection yard were considered and it does not include the actual cost to service each customer.

The results of this analysis indicate that the annual cost to transport commingled materials to the West Van MRF is about $1,000,000 per year. Over the next 20 years considering the growth in population, the cost is estimated to exceed $30M. If a new MRF were located in thevicinity of the sites shown on the map, the annual transportation cost would range from $450,000 to almost $700,000 per year compared to the $1M. When projecting these costs out over the next 20 years the total transportation cost is estimated to range from $13.2M to 19.4M. This represents a saving of between $11M to $17M over the 20 years. These savings would be reflected in future collection rates and/ or reduce future increases in those rates.

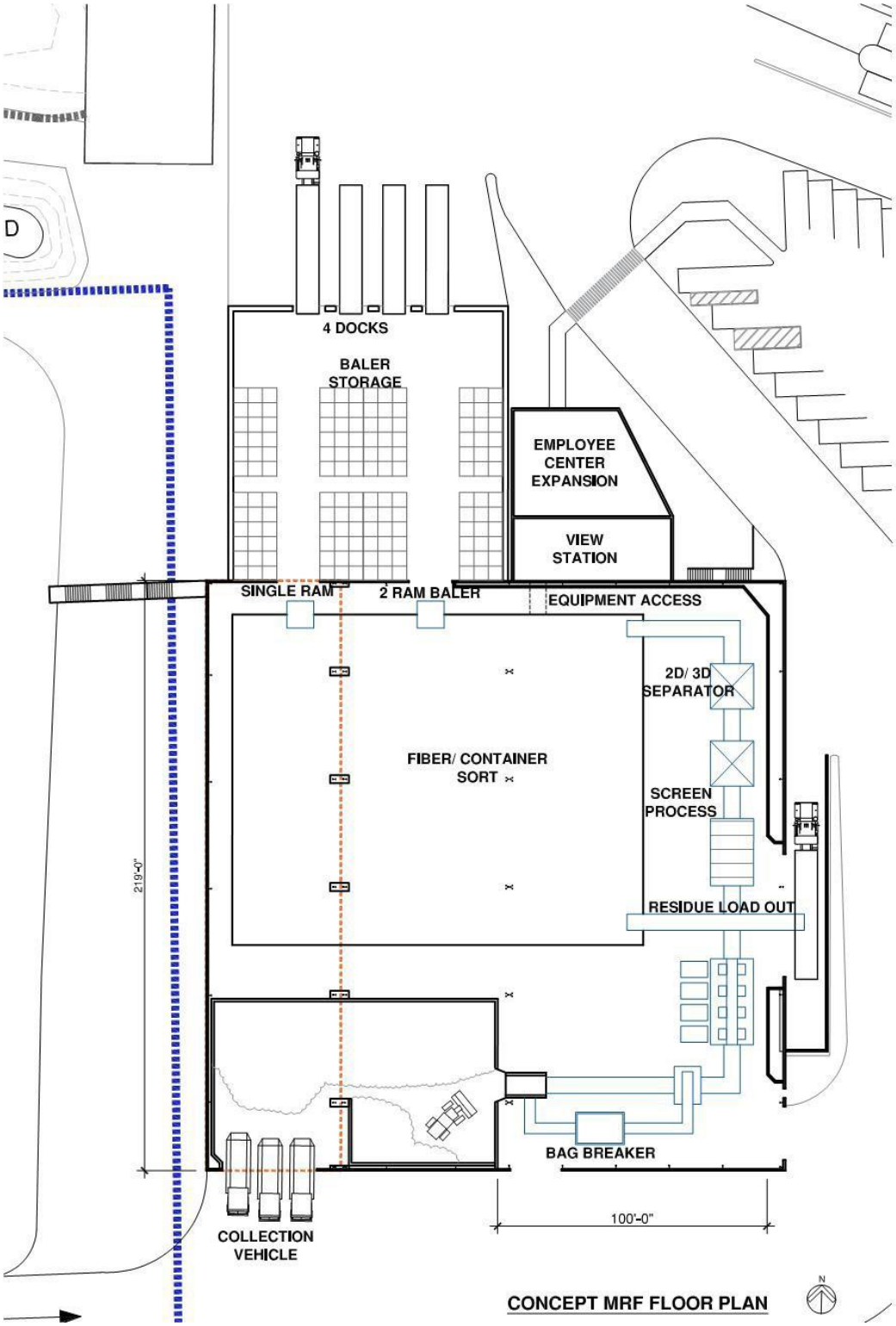
The estimated savings in transportation cost is only one factor to consider. Other factors include reduced emissions, less wear on roadways, and perhaps reduced time and cost to transport materials to markets.

7.12 Convert CTR to New MRF

Another consideration for a new MRF may be to retrofit the CTR facility. In Chapter 5, one of the options for serving the north service area is to replace CTR by siting and building a new transfer and recycling station at a new location. Reasons to consider this approach relate to the high volume of traffic that must access the facility off a very busy Hwy. 503. Also, expanding CTR to properly manage future waste flows would entail developing the adjoining west side property that once served as a landfill. And the neighboring land uses have transitioned to include more residential developments.

The facility condition assessment found that the current CTR structure to be in good condition. The County and CRC must make a significant investment in the transfer station to improve current operations and to provide the facilities to meet expected growth. However, reasons stated here and discussed in Chapter 5 suggest the CTR may not be the best location for the long term. Thus, any option should consider how best to use this asset in the regional countywide system. If a new transfer station was sited, CTR could be retrofitted to install a new materials processing line. This line would replace the current outdated equipment line at West Van. Figure 7.6 on the following page shows a conceptual floor plan for converting CTR to an MRF.

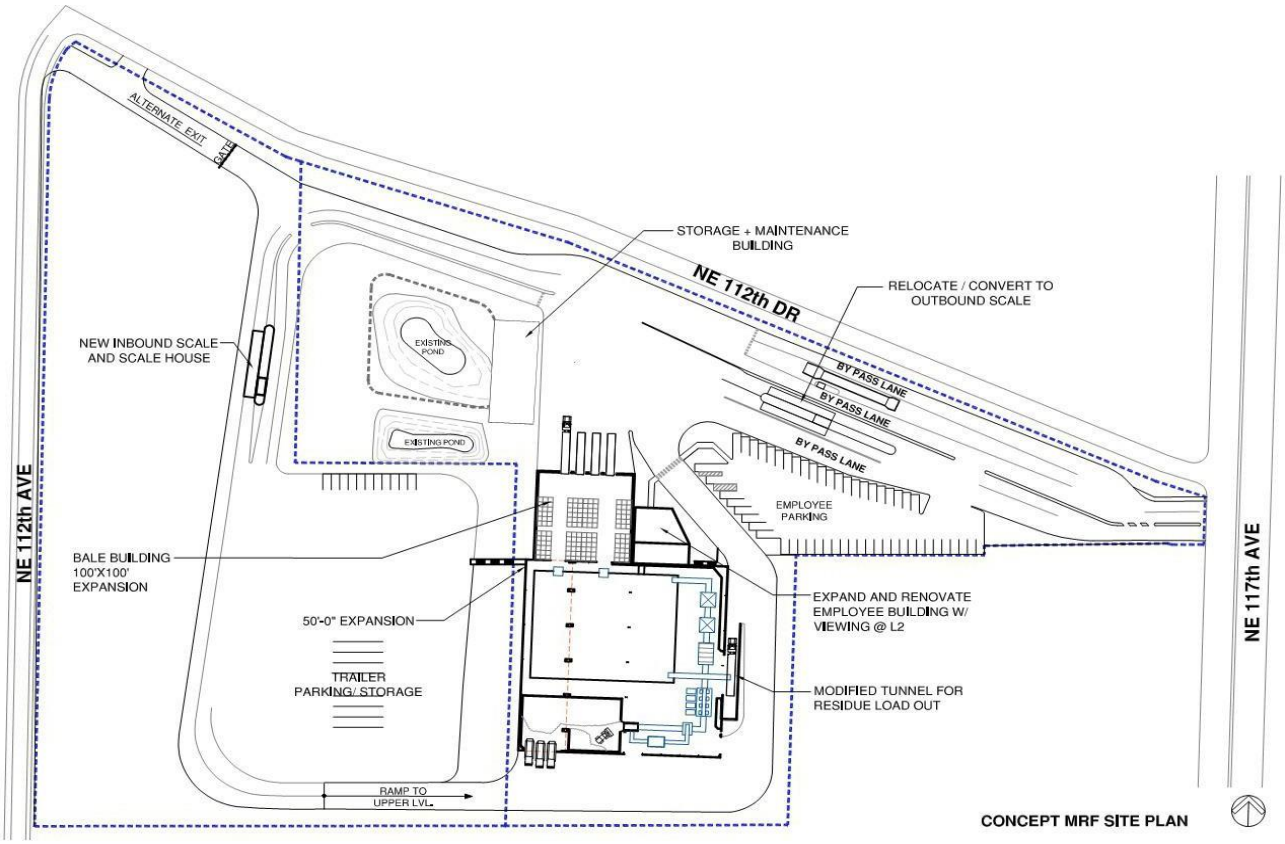
Figure 7.6: CTR/MRF Floor Plan



Under this concept, the main structure would remain intact and a 50-foot expansion on the west side could be constructed. With this addition CTR can accommodate the installation of a modern processing system for recyclables. This expansion would occur entirely on the existing property. A new bale handling building could be added on the north side needed to store and ship commodities to markets. Also, the existing transfer tunnel, that currently houses the compactor, would be modified to load out residue from the commingled materials being processed.

This site plan to convert CTR (Figure 7.7) would incorporate the phase 1 improvements being planned to address immediate traffic concerns.

Figure 7.7: CTR/ MRF Site Plan



The estimated construction costs for these improvements are as follows.

Building Expansions w/Site Work	$4,600,000
Expand and Renovate Employee Building	$1,700,000
Retrofit CTR (push walls/ floor repair/ skylights	$1,800,000
Total Building	**$8,100,000**
New Processing System	$15,000,000 - $18,000,000
Total Estimated Cost	**$23,100,000 - $26,100,000**

This option provides several potential benefits to the regional system.

1. Implementing this approach will ensure there are no interruptions in services.
    a) CTR and the West Van MRF can continue to operate while a new transfer station sited and built is expected to take about 5 years.
    b) Once the new transfer station is operational, CTR can be converted to a MRF, and a new modern MRF processing system installed.
    c) The West Van MRF can be decommissioned, and the space can be repurposed for other operations such as processing organics, construction /demolition waste, or future needs as identified as part of updating the SWMP.
2. Both the CTR/MRF and the new transfer station would both be centrally located to reduce travel times for both garbage and commingled collection trucks.
3. The new transfer station can be located in a more standard industrial /commercial zoned area and will be designed to receive the waste generated in the north county with improved access off a main collector or arterial street.
4. Converting CTR to a MRF will result in significantly reducing traffic at the facility by eliminating the self-haul customers. The MRF will generate on average, about 230 trips per dayand only a few on the weekend. The current CTR transfer station operation averages over 600 trips and as many as 1,000 trips in peak periods.
5. The cost to implement this approach is less than expanding CTR and building a new MRF but more than if West Van were to install a new equipment line and building out CTR. This does not account for added value for the ability to use West Van for other operations.

7.13 Findings of MRF Replacement Options

The results of the study are summarized in Table 7.10 that shows a comparison of the various options for installing a new system to process commingled materials. The lowest cost option would be to install a new equipment line at West Van to process all of Clark County's materials and to import materials from outside the County. Even if the County were to process only the materials generated within the County the overall operating cost is estimated to be $25 per ton less than the current system and would increase the recovery rate from 67% to 80% of materials processed. This system could be designed to also process select commercial loads that may contain a higher percentage of recyclables.

Table 7.10: Summary of MRF Replacement Options

Performance Metrics	Existing West Van MRF	WV-1 New Equip. at West Van	WV-2 New Equip. and Expansion atWest Van	N-1 New MRF New Location	N-2 New MRF w/Imported Materials	Convert CTR to MRF
Material Processed (TPY)	52,400	52,400	100,000	52,400	100,000	100,000
Diversion	67%	80%	80%	80%	80%	80%
Est. Construction Cost	0	$4,000,000	$6,000,000	$25,000,000	$25,000,000	$8,000,000
Throughput Rate (TPH)	15	30	30	30	30	30
Operating Shifts	2 (16 hrs. +OT)	1 (8 hrs.)	2 (16 hrs.)	1 (8 hrs.)	2 (16 hrs.)	2 (16 hrs.)
Equipment Cost	$0	$15,000,000	$18,000,000	$15,000,000	$18,000,000	$18,000,000
Annual Ops. Cost	$6,700,000	$5,500,000	$8,200,000	$7,200,000	$9,700,000	$9,700,000
Estimated Ops. Cost / Ton	$128	$105	$82	$133	$97	$97
Estimated Revenue *	$1,700,000	$2,200,000	$4,000,000	$2,200,000	$4,000,000	$4,000,000

*Revenue estimates are based on the sale of materials at the blended rate of $46 per ton recovered.

The option to build a new MRF at a more central location may have long-term benefits. As indicated the cost of transporting commingled materials would be significantly less than continuing to drive to the West Van facility. If the decision is to build a new MRF, the option to convert CTR may be viable and should be considered as it could provide added benefits to the system. In either situation, a new facility (transfer station or an MRF) would need to be sited in the County. Additional benefits were listed, and all factors can be considered to implement the best long-term strategy for enhancing recycling services in the County.

In summary, the decision to invest in a new processing system is often driven by many factors. In California, the decision to process more and recycle more materials is driven by either state or local goals or mandates. Another factor is how much is the community is willing to pay for recycling to meet certain goals. The County's current system can process all the commingled materials generated, albeit at a higher cost than if a more advanced processing line were installed. And, as the financial analysis shows, installing a new process system to process the current recycled stream will have cost savings. However, the most cost-effective option is achieved by processing more materials than is currently collected in the County. The current system is designed to primarily process commingled materials from residential sources. A new system could be designed to process high-graded loads from commercial sources in the County or possibly commingled materials could be imported from other jurisdictions.

Chapter 8

Summary of Findings and Recommended Actions

The Phase 1 report presents the results of a comprehensive review of the current solid waste and recycling facilities servicing the County. It documents a detailed assessment of the existing facility conditions, identifies capital improvements to meet immediate needs, and considers the long-term infrastructure required to meet the growth in the County over the next 15 to 20 years.

This report also documents a thorough analysis of various operational improvements to the facilities. The most critical need is to make improvements at CTR to address safe access at the entrance and to expand gatehouse and queue space on-site to avoid having customer traffic backing onto Hwy. 503 as is currently the case. The JRMA project team developed several options and the cost to address these concerns and to consider how to expand the facility.

This report also provides a list of improvements to expand the Washougal Transfer Station. These options are presented in concept and more detailed planning and design will be required once decisions are made on what direction to advance the system.

At the West Van, the assessment indicates there are no immediate, critical needs to address but there are more long-term needs and opportunities. A full assessment of the MRF equipment and system performance review was conducted. The current MRF equipment is outdated and will need to be replaced in the near future. Until then CRC has made some improvements to enhance the system performance and reduce the cost to process materials. The cost of a new equipment line to process the commingled recycle materials is estimated to be between $15M and $18M based on similar installations.

Finally, this report includes a full assessment of the cost of services for each facility. The cost-of-service analysis was used to prepare a financial model to project revenue requirements for financial planning and setting rates considering system alternatives. The model incorporates the estimated capital investments resulting from the facility assessments and options reports.

8.1 Summary of Options

The completion of the Phase 1 report lays the groundwork to build the necessary infrastructure to serve the County for the next 20 years and beyond. The current transfer station and recycling facility system have remained largely unchanged since the 1990s with the exception of the addition of the Washougal Transfer and Recycling which was built in 2009. Since the 1990s, the population of the County has more than doubled and all cities have experienced this growth.

The majority of this growth is occurring in the central and northern parts of the County where rural areas are transitioning into densely urbanized areas.

The assessment of the physical structures at the three transfer stations indicates the facilities have been well maintained. They simply do not have the capacity to efficiently handle the number of customers and waste volumes generated today or in the future given the ongoing significant growth in the County.

The report addresses options that consider the opportunity to potentially locate new facilities location while still maximizing the use of existing facilities. The findings and recommendations in the Phase 1 report can be summarized in terms of three primary scenarios for making future capital investments. There are strengths and deficiencies in each scenario which are summarized below.

A primary issue is how much capital is needed for improvements to facilities for continuing to provide efficient processing, transfer, and disposal of solid waste and recyclable materials. The Phase 1 report takes a holistic approach in identifying the systemwide capital improvements that are needed in terms of efficiency gains in the system while maximizing service capabilities (e.g., material processing) over the long term. It presents the options for modernizing the solid waste system.

The timing of the completion of the Phase 1 Report and initiation of the Phase 2 work also coincides with updating the CSWMP.

The next step in this process is to submit the Phase 1 report findings to the County Council and participating cities and stakeholder groups to decide on a direction for making the infrastructure improvements.There are three primary scenarios for building the facilities needed over the next 20 years.

8.2 Solid Waste System – Scenarios

Each scenario is described and accompanied by a preliminary cost estimate to construct the improvements. A list of advantages and disadvantages is also provided for decision-makers to consider when comparing one scenario vs. another.

Scenario 1 – Upgrade all Existing Facilities to Serve the County

This scenario is based on the decision to upgrade all existing transfer stations and retain theMRF operations at West Van. It reflects the assumption that the current facilities are located adequately to satisfy the long-term needs of the solid waste systems and makes no changes that would affect the collection services.

1. **Expand CTR to serve as the primary transfer and recycling facility for the next 20 years.**

   This report details several options for making improvements to CTR, so it can operate more efficiently and handle the impacts from growth in this part of the County. The preferred option will require gaining approval to expand onto the adjacent property west of the existing site. The adjacent property is a closed construction and demolition landfill. Before any new structures are built, the environmental and subsurface conditions will need to be investigated further. Land use approval of an expansion will need to be completed. New residential developments have been built on both the north and west sides of CTR potentially complicating efforts to permit expansion of the facility onto this property.

   CTR – Improvements to expand the current structure; and improve circulation to eliminate off-site queue **$14M to $17M**

2. **Expand Washougal Transfer Station**

   The Washougal Transfer Station is experiencing the impacts of growth in both Camas and Washougal and the eastern part of the County. The building will need to be expanded to handle the increase in customer traffic and the amount of waste received. The cost for making improvements is estimated to range from $1.5 to $2M.

   Washougal TS Improvement **$1.5M to $2M**

3. West Van MRF Improvements

There are no immediate capital needs to expand the West Van Transfer Station. The facility can handle the customer traffic and waste received in the near future. However, space is limited for handling other waste streams in particular food waste that is collected from select generators as part of a pilot program. It is expected that the food /organics waste streams will expand as programs to separate food waste expand. This report has recommended that a master plan for the entire site be prepared to consider how this valuable resource can be developed to handle other waste streams such as food waste and construction/demolition debris.

In this scenario, the plan would be to replace the existing MRF processing equipment line at the West Van. As the old system is removed and new equipment is installed, the County would be required to transport commingled recyclables out of the County to other MRFs operating in the region (Estimated 9 to 12 months). This cost is not included in this analysis.

West Van Improvements **$4M to $6M**

Scenario 1: Total Estimated Construction Cost Over Next 10 Years $19M to $25M

Scenario #1 System Impacts

Upgrading all existing facilities appears to be the most expedient approach for system improvements and initially requires less capital than the other scenarios. Collection services will not be impacted and will remain as is current. It does not improve collection services for commingled recycled materials that must travel to West Van to unload. As the north/central portion of the County continues to grow, more collection vehicles will need to make the trip to West Van to unload some maybe twice a day.

Expanding CTR onto the adjacent property may encounter challenges from neighbors to develop this property given the changing nature of the area. Also, in the future, all customers leaving the site must turn right. Those customers traveling from the north county will need to travel south on Hwy. 503 and find a new route for return to their origin.

Advantages

1. Requires the least capital cost
2. Does not require siting any new facilities in the near future
3. Makes use of existing facilities

Disadvantages

1. Access to CTR off Hwy. 503 is less than ideal
2. CTR will operate adjacent to residential properties
3. Land use approval of CTR expansion may have challenges
4. MRF at West Van requires the longest travel times for commingled collection trucks
5. When a new recycling processing line is installed at West Van materials will need to be transported to an out of County MRF facility for 9-12 months
6. Provides no space for new facilities that may be needed to process organics or construction/demolition waste, or other infrastructure identified by CSWMP

7. Possible that West Van facilities will need to be expanded in the future

Scenario 2 – Upgrade CTR and Washougal – Build a New MRF

This approach is based on expanding CTR but recognizes the benefit of building a new MRF at a central location to be determined. It also allows the space vacated by removing the MRF processing equipment at West Van (approximately 45,000 sf of enclosed space) to be used for other purposes to meet the future needs of the solid waste system. Examples include processing organics and/or processing construction and demolition waste at West Van.

Build a New MRF for Recycled Materials	**$25M t0 $30M**
Make Improvements at CTR and Washougal per Scenario 1	**$15M to $19M**
Scenario 2: Total Estimated Construction Cost Over Next 10 Years	***$40M to $49M***

Scenario #2 System Impacts

This approach continues the theme of upgrading and expanding CTR and Washougal Transfer Stations. It recognizes that locating a new MRF in a more central location may result in the least transportation cost to the system in the long term. It requires time to site and build a new facility and therefore will require additional capital investments. Assuming the County would contract this to a private vendor, the vendor would be responsible for siting and building the facility.

Advantages

1. Makes use of existing transfer stations
2. If centrally located the new MRF should reduce costs attributed to collecting commingled materials. (Preliminary estimate is about $1M per year based on current collection services)
3. Processing recyclables at West Van can operate while a new processing system is installed at the new MRF.
4. Provides flexibility by creating space at West Van that can be re-purposed for future operations

Disadvantages

1. Requires the largest capital investment of the three scenarios.
2. Access to CTR off Hwy. 503 is less than ideal
3. CTR continues to operate in a residential environment
4. Land use approval of expansion may have challenges
5. Requires siting a new MRF facility

Scenario 3 – Build New Transfer Station to Serve North/Central County and Convert CTR to MRF

This approach is based on siting a new transfer station to replace CTR. It recognizes the current CTR site is not the best location for the long term due to the potential impacts/disadvantages listed in the previous scenarios. Several factors weigh into such a decision. First, direct access off Hwy. 503 is less than desirable given high traffic volumes. Second, thesurrounding neighborhood has been developed with more residential property adjacent to thestation. Third, expansion of the facility will require building on the adjacent old landfill property on the west side. Rather than retrofit CTR with less-than-ideal conditions, the County would proceed with a siting study to identify

a suitable property from developing a new transfer station. Once the new transfer station is operational (est. 5 yrs.), CTR would be converted to a new MRF. After the new equipment line is installed at CTR the old system would be removed and the space at West Van can be re-purposed (approximately 45,000 sf.)

1. Build a Transfer Station	**$26M to $30M**
2. CTR – Phase 1 Circulation and Traffic enhancements	**$3M**
3. **Retrofit CTR to MRF**	**$7M to $8M**
4. Washougal TS Improvements	**$1M to $2M**
Scenario 3: Total Estimated Construction Cost Over Next 10 Years	**$37M to $43M**

Scenario #3 System Impacts

This scenario requires the County to site a new transfer station. It also takes advantage of the current infrastructure by converting CTR to an MRF. This will result in CTR receiving only commingled collection trucks (less than 100 vehicles per day) versus the current customer traffic (800 to 1,000 vehicles per day). The facility will receive only recycled materials five days per week with possibly a few trips on Saturday. This will have a significant positive safety impact on traffic on Hwy. 503 over the current conditions. Also, the adjacent residences will not have to observe the traffic at the gatehouse and operations into evenings and on weekends.

Locating and permitting a site to build a new transfer station will require time to gain approval and permits but may be best in the long run. First, it can be built to handle the customer traffic expected from population growth and manage the future waste volumes generated in the north County region. A new site can potentially be developed in a more commercial/industrial area that has good access to arterials and primary collector streets.

Advantages

1. Makes use of existing transfer stations
2. Requires less capital than Scenario 2
3. When the new transfer station is operational CTR can be converted to a MRF only operation
4. Existing MRF can continue to operate while CTR is converted avoiding transportation of recyclable materials to an out-of-county facility
5. CTR MRF is centrally located and can reduce costs attributed to collecting commingled materials
6. Provides flexibility by creating space at West Van that can be re-purposed for future operations
7. Has the potential to provide the lowest system cost by building a new more efficient transfer station and reducing overall system collection and transportation costs
8. Eliminates safety risk of having high customer traffic access off Hwy. 503
9. Avoids development onto the adjacent property at CTR

Disadvantages

1. Requires more capital than Scenario 1
2. Requires time to site and permit new transfer station

8.3 Key Decisions and Recommendations

Based on findings from this Phase 1 Report, Clark County will need to invest between $25M to as much as $50M to build the infrastructure for managing solid waste and recyclables for the next 20 years. This does not include the estimated $15M to $18M for new processing equipment at the MRF. Most of the improvements will need to be made in the next five to ten years. This scenario also assumes that in the short term traffic improvements are constructed at CTR to eliminate traffic queuing onto Hwy. 503.

The cost of services study for the operation of transfer stations was completed. A cash flow analysis that includes a fair operating margin for transfer station operations shows the ability to fund these improvements under the current rate structure. This assumes a new operating contract is executed that establishes a set operating margin for CRC and creating some mechanism to use funds generated from existing rates for the above capital. In Phase 2 of the Regional Solid Waste System Study, JRMA will complete more detailed engineering studies to produce a final CIP and a schedule for implementing the plan. It will also include working with County staff to evaluate the ownership options and coordination with the ongoing process of updating the CSWMP. Before expending efforts on the Phase 2 report there are some key decisions to be made by the County.

Phase 1 Recommendations

The Phase 1 report has identified three scenarios for developing the infrastructure needed to meet the needs of the solid waste system for the next 20 years. In addition to the capital improvements required for the system, it provides the background information necessary to understand the critical issues related to the current contract extension and system ownership. Listed are recommendations based on the result of the Study.

1. The County should establish a fair operating margin to compensate CRC for continuing with operations of solid waste facilities for the next five years or for a set period to be determined.
2. Revenues generated above the cost of services plus the established operating margin should be remitted to the County. The remitted revenues will be encumbered for future solid waste system facilities and improvements.
3. The County should establish a facility Renewal and Replacement (R&R) evaluation process and a dedicated fund that will maintain system assets.
4. The County should approve funds for implementing Phase 1 of the CTR site improvements to eliminate any potential for inbound customers from queueing onto the public right of way on State Hwy. 503. The improvements include extending the entrance road and new scale onto the adjacent property located west of the current transfer station. Details of these improvements should be negotiated as part of the contract extension.
5. The County should establish a minimum rate for all customers using the transfer stations. Under the current tip fee policies, customers that bring less than 300 lbs. are not paying the cost of services. Implementing this policy may also provide an incentive to subscribe to regular collection services or cause customers to make fewer trips by consolidating their loads.
6. The County should extend the hours of operations at both the West Van and Washougal transfer stations.

Phase 2 Study

The results of the Phase 1 Study have detailed specific operational and master planning questions that need to be addressed as part of developing and implementing a 10-year CIP. The key questions to be answered are as follows:

- Should CTR continue to operate as the primary transfer station over the next 20 years or should a new transfer station facility be built?
- Should the MRF continue to operate at West Van or should the MRF be sited at a more central location to where materials are generated thus reducing overall collection and transportation costs and using the vacated space for other system needs?

The County and the cities are currently negotiating to extend the contract with CRC until December 31, 2026. The negotiation is expected to clarify the direction they will take regarding future ownership of the system. Negotiations should determine how the future capital improvements will be paid for under the current rate structure.

Phase 2 of the Regional Study includes the following task to provide additional information for decision-makers.

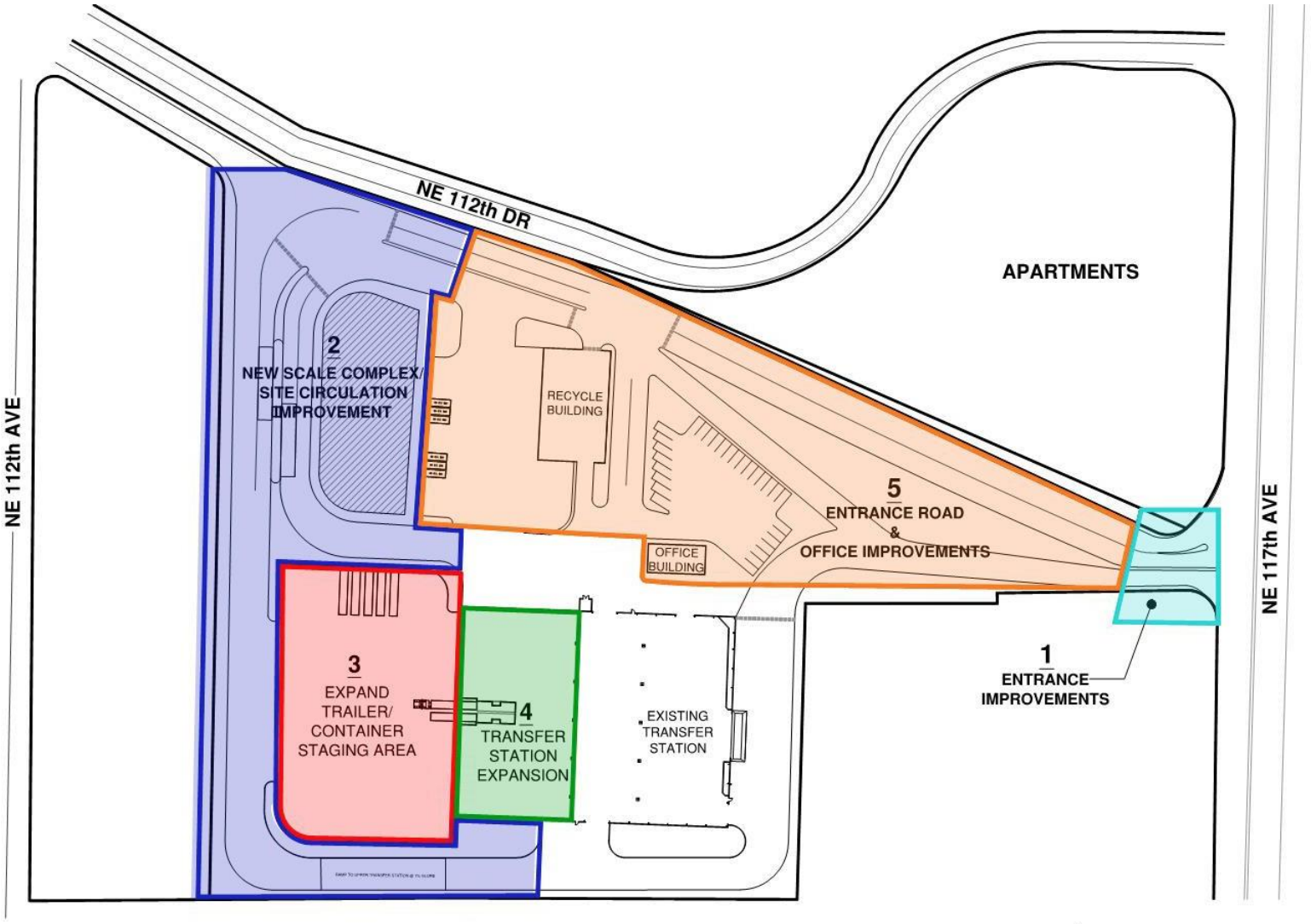
1. Completion of subsurface investigations on the property west of CTR to determine the conditions or limitations for consideration of the option to expand CTR.
2. The County should move forward with the CSWMP. A priority of the CSWMP will be to identify needs for additional facilities for managing waste in the future. Two items that have been discussed in the course of completing the Phase 1 report are the need to manage food waste as part of a regional organics management strategy and providing facilities to handle construction and demolition waste.
3. Complete the search to locate a new transfer station to serve the north/central parts of the County. The siting study should identify the preferred site for building a new station.
4. Complete a more detailed plan for expanding the Washougal transfer station.
5. Complete the Renewal and Replacement /CIP financial plan for the regional system.

Phase 2 of the Regional Study is expected to be completed within the next 24 months and will be coordinated with Phase 3 – Update of the Comprehensive Solid Waste Management Plan (CSWMP).

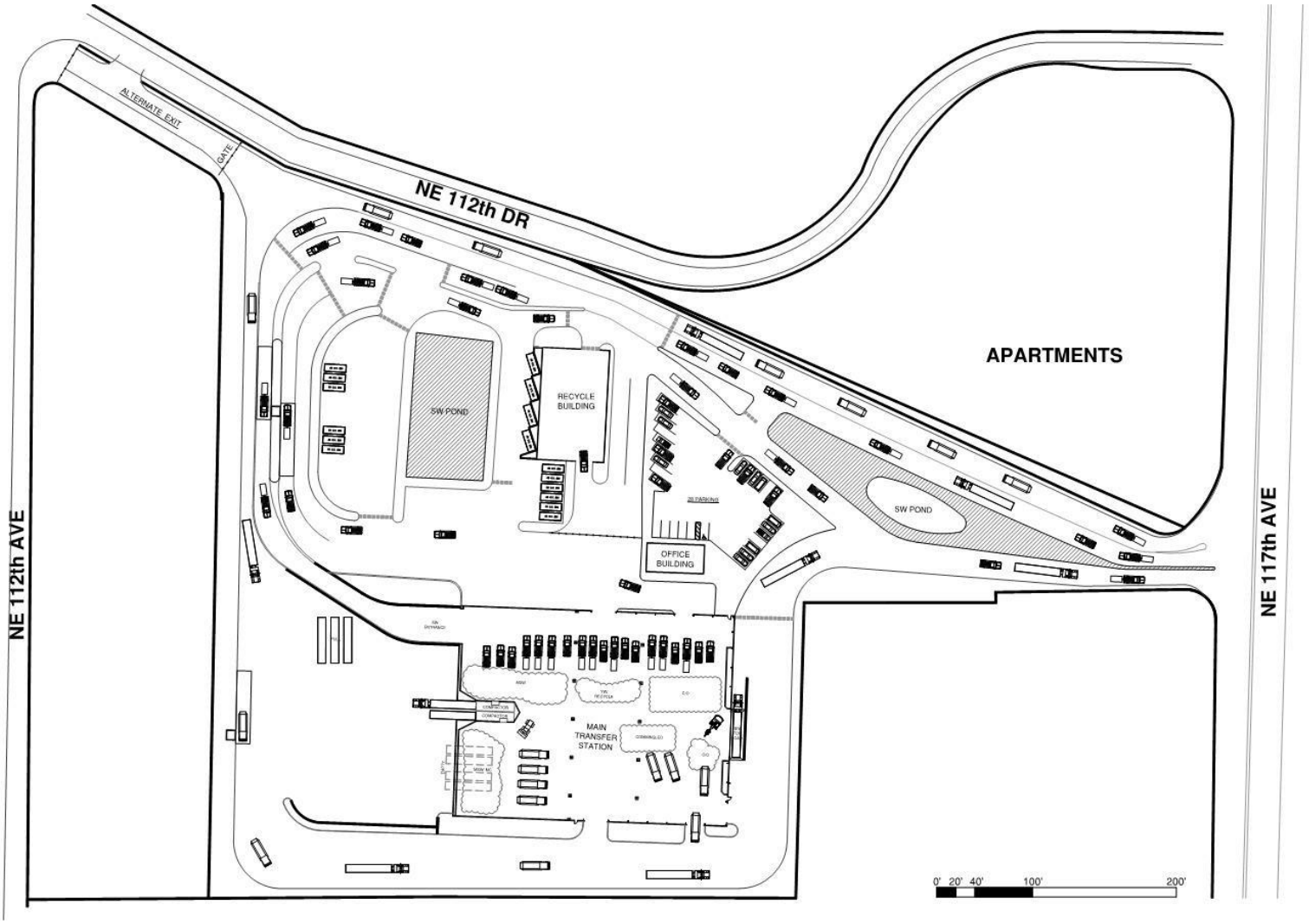
Appendices

Woodland
La Center
Yacolt
Ridgefield
Battle Ground
Vancouver
Camas
Washougal

APPENDIX A – CTR Master Site Plan Options



OPTION 1 - CTR MASTER IMPROVEMENT CONCEPT PLAN



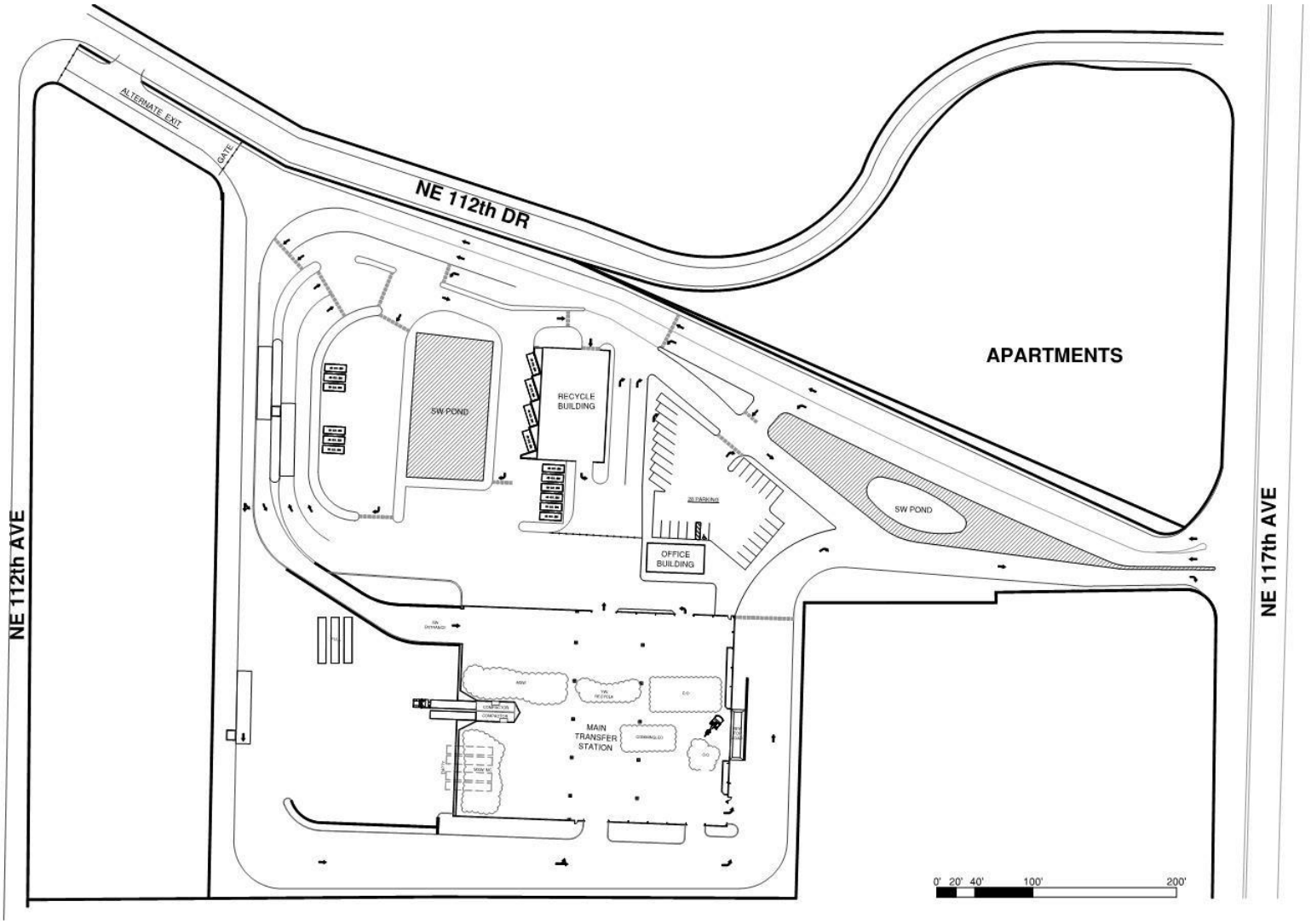
JRMA ARCHITECTS ENGINEERS

N

OPTION 1

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

N

OPTION 1

Central Transfer and Recycling Center
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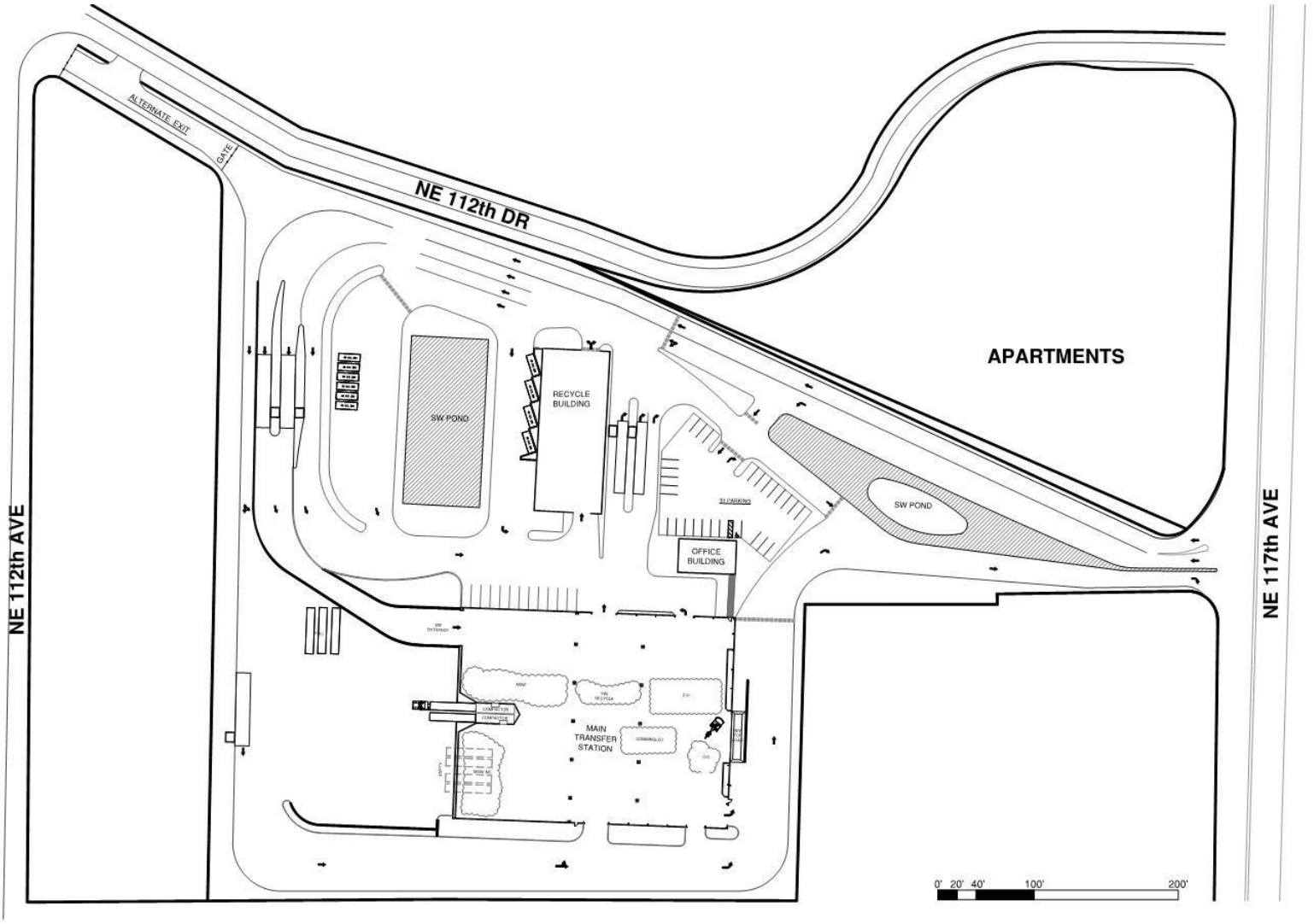
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

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OPTION 2

Central Transfer and Recycling Center
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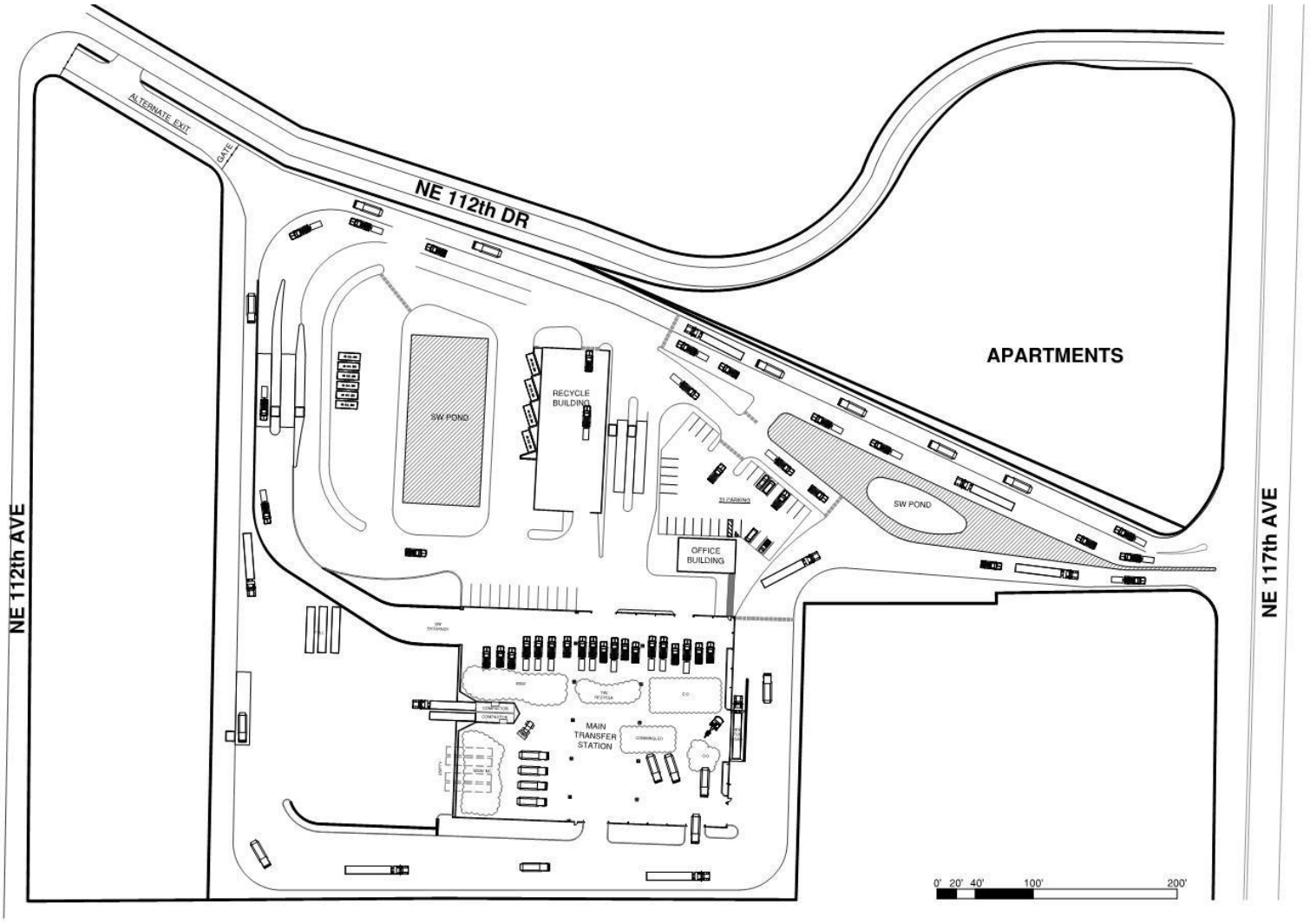
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



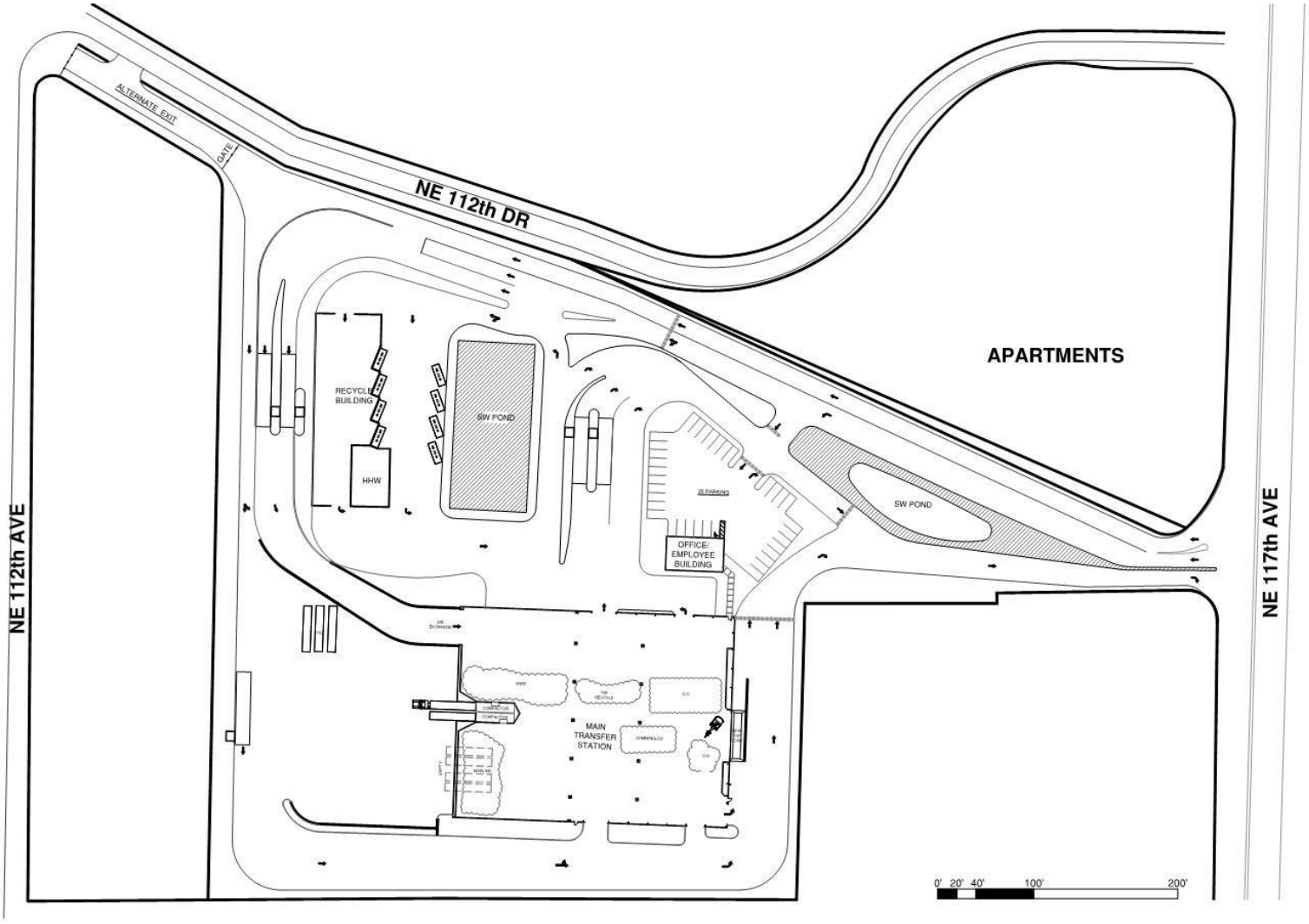
JRMA ARCHITECTS ENGINEERS

N

OPTION 2

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

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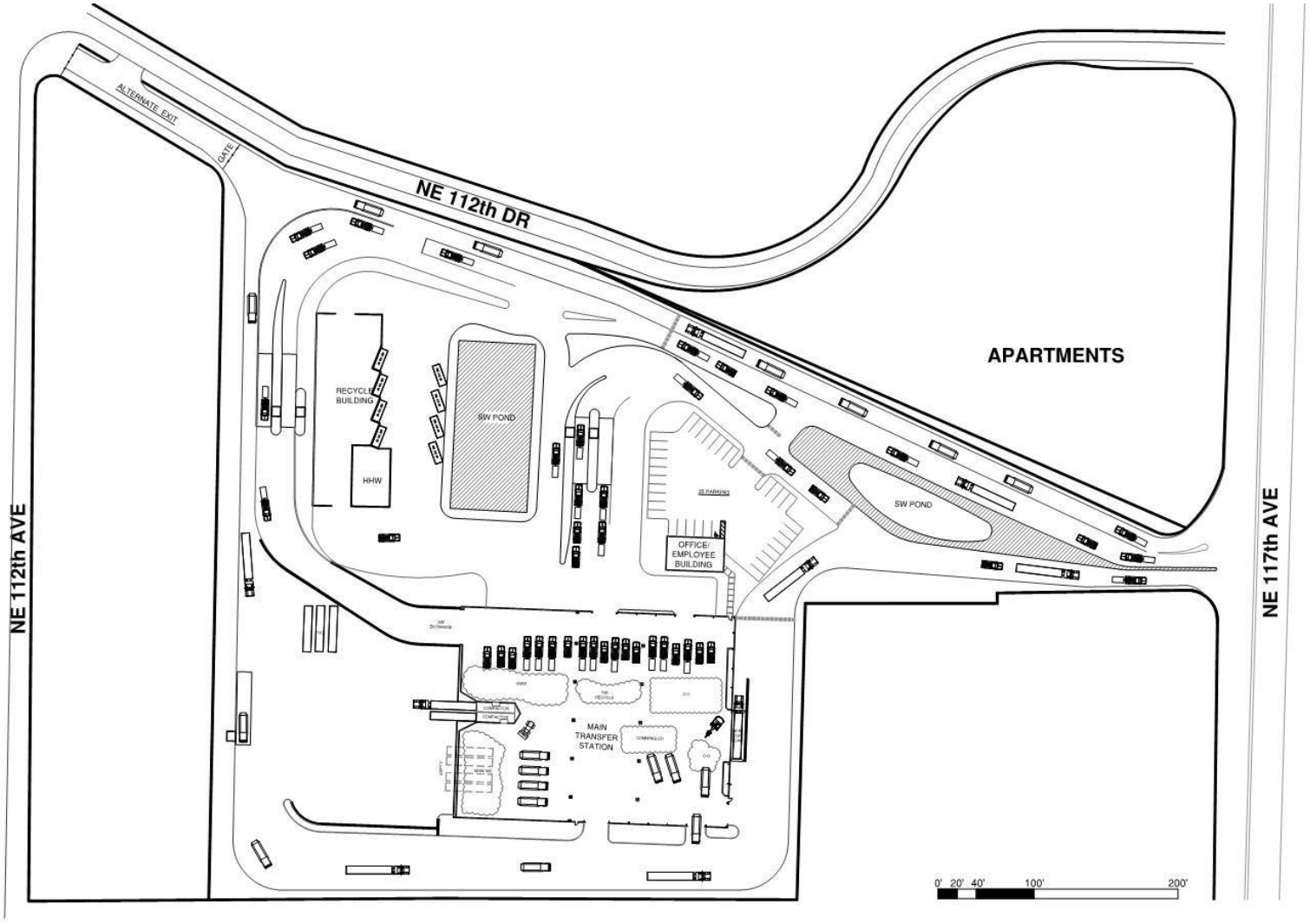
OPTION 3

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



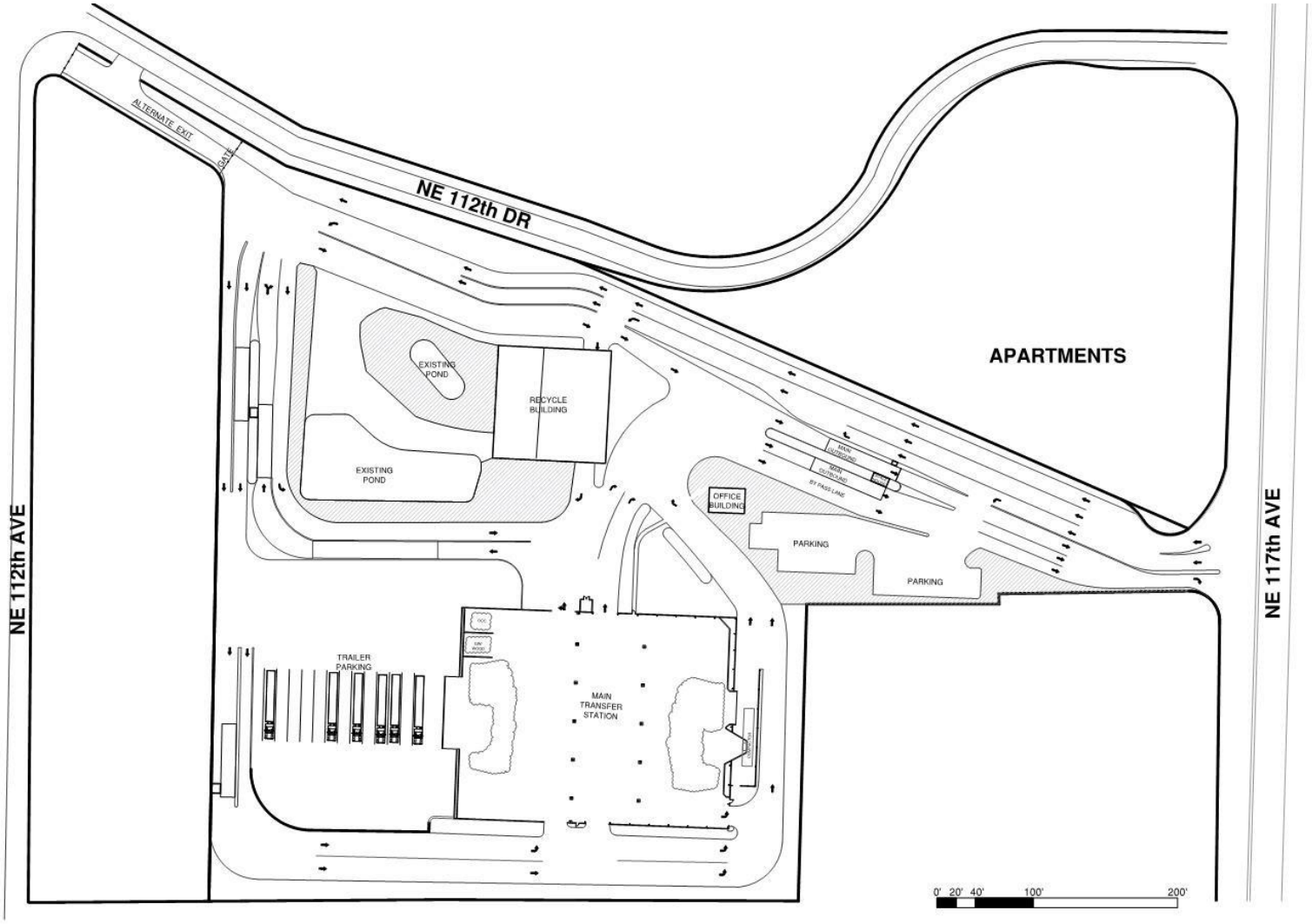
JRMA ARCHITECTS ENGINEERS

N

OPTION 3

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

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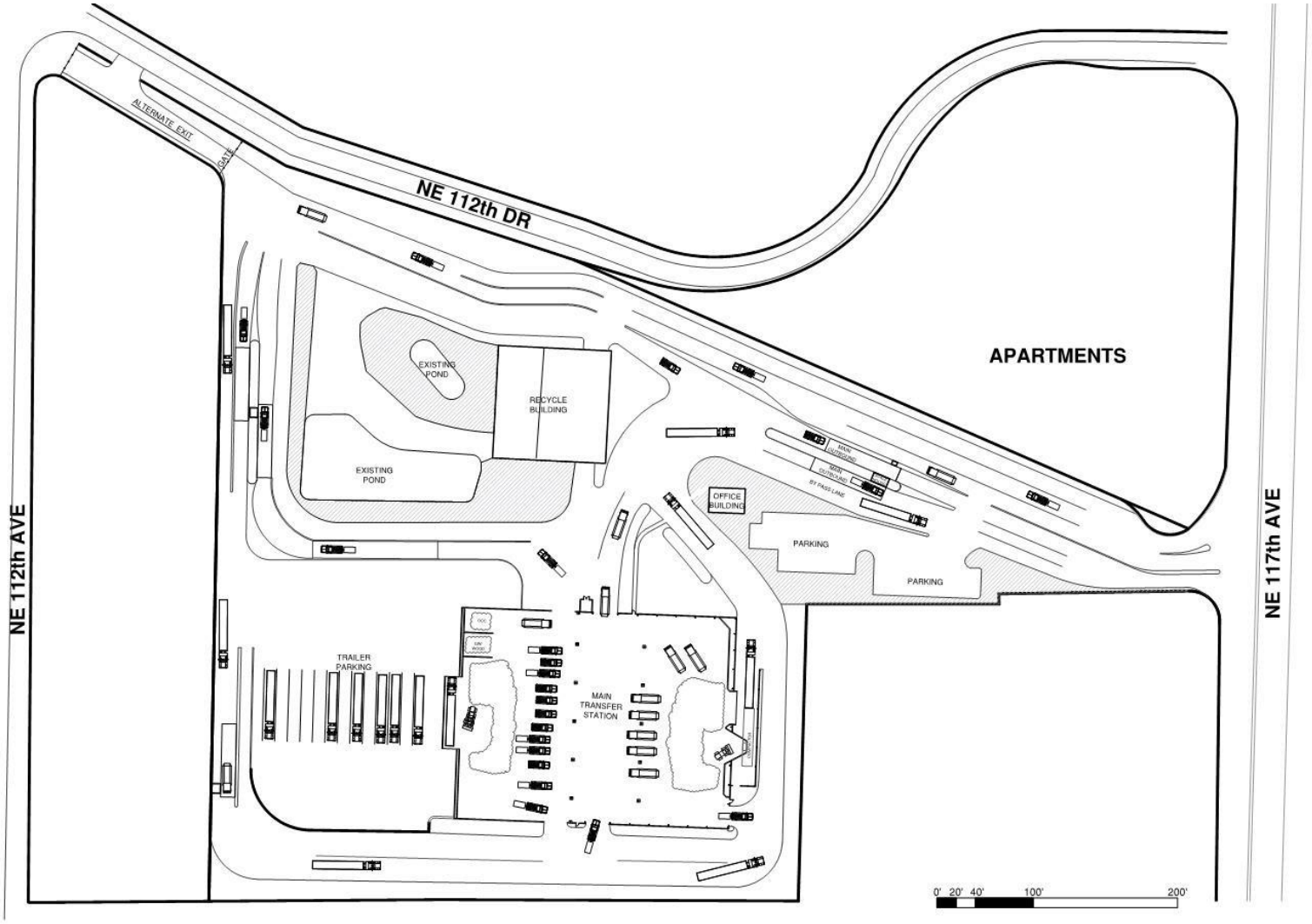
OPTION 4A

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



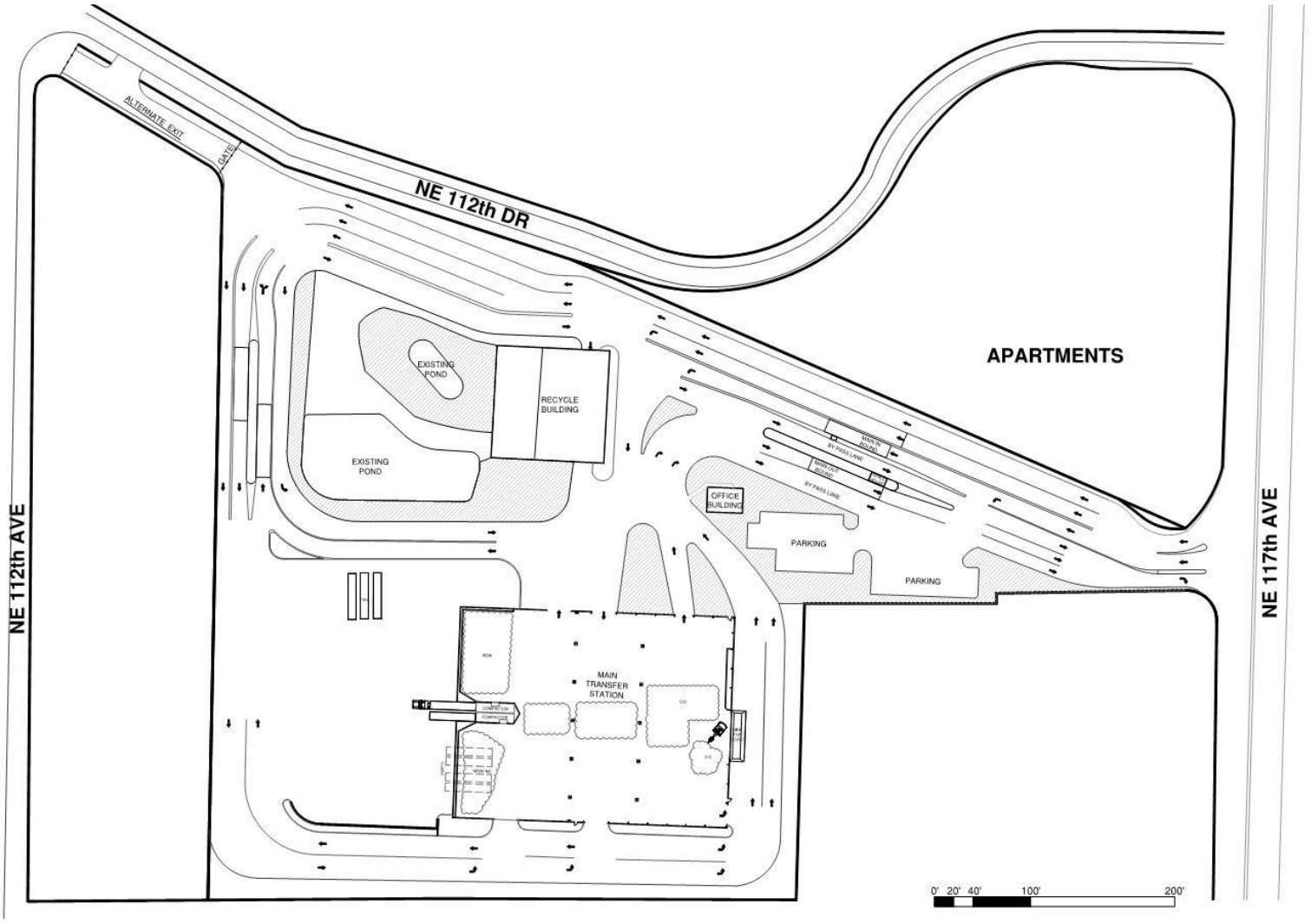
JRMA ARCHITECTS ENGINEERS

N

OPTION 4A

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

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OPTION 4B

Central Transfer and Recycling Center
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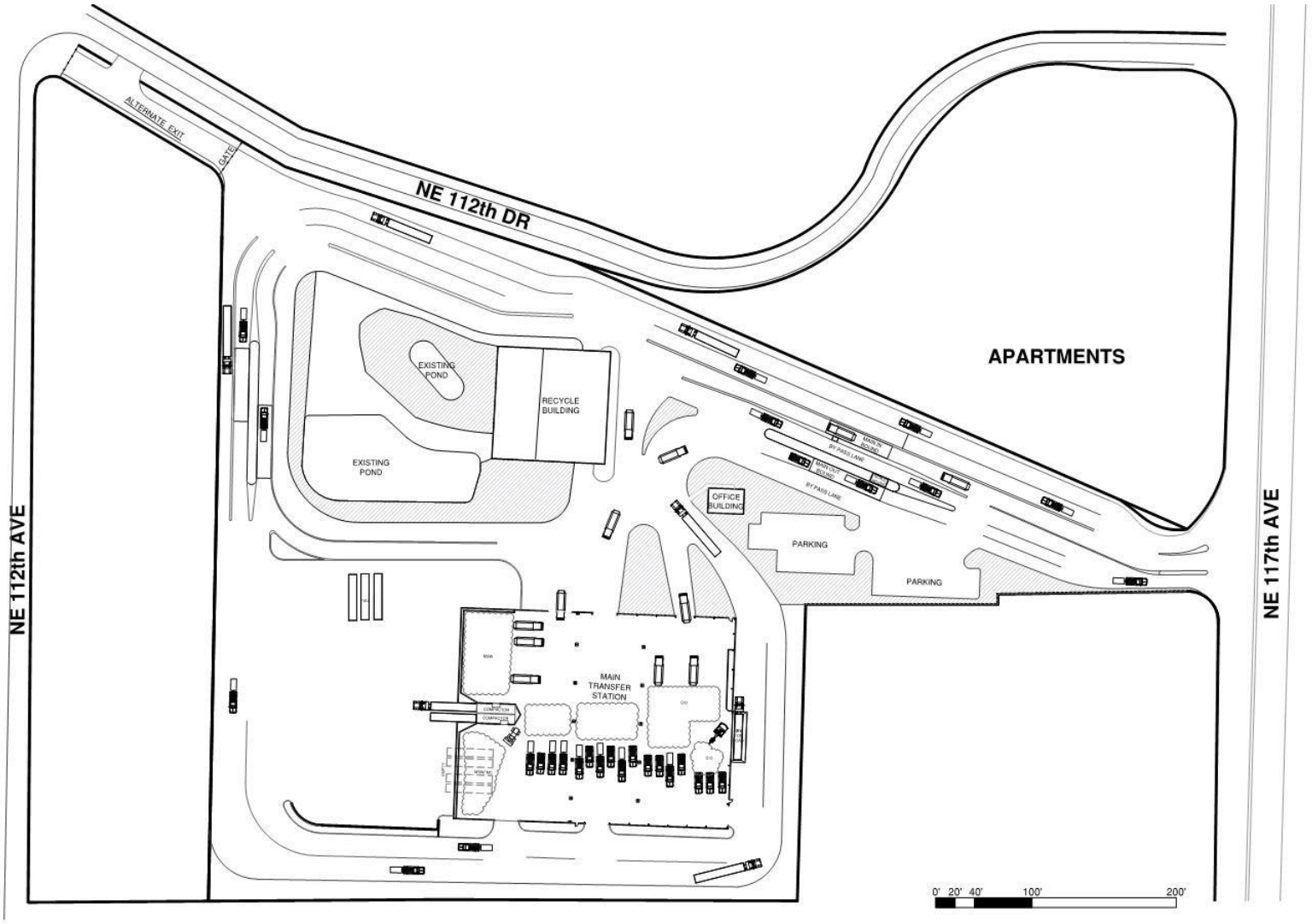
Vancouver, WA 98662

Job No. 5555-0
09.14.2020



JRMA ARCHITECTS ENGINEERS

N

OPTION 4B

Central Transfer and Recycling Center
11034 NE 117th Avenue
Vancouver, WA 98662

Job No. 5555-0
09.14.2020

Appendix B – CTR Conditions Assessment

Limited Structural and Exterior Site Improvement Conditions Assessment

Clark County Central Transfer and Recycling (CTR) is a privately owned solid waste transfer station that serves residents and commercial users of Clark County, Washington. The facility is in the Orchards neighborhood of unincorporated Clark County, along Northeast 117th Avenue (Washington State Route 503), approximately a half-mile north of the intersection with Padden Parkway (State Route 500) and Northeast 117th Avenue (State Route 503). The address of the facility is 11034 NE 117th Ave. Vancouver. An aerial view of the facility is shown in Figure 1.

Figure 1 – Aerial View of Clark County CTR

The facility resides on an irregularly shaped parcel of land and includes three main structures that make up the facility operations. The solid waste transfer station is the main structure. There is also a recycling building, a HHW building, and an administrative and operations office building. The facility was originally constructed circa the 1970s. In 1991, a new20,000 sf transfer station was added to replace the original transfer building. The original building was expanded and converted to the recycling and HHW building. An automatic scale system for route trucks was installed in 2012.

In 2019, the County commissioned J.R. Miller & Associates, Inc. (JRMA) to conduct an overall facility existing conditions review as part of Task 4 of the Clark County Regional Solid Waste System Study's scope of work. The goal of this assessment was to observe, determine the condition of the assets, and make rehabilitation recommendations. This document summarizes our assessment findings and will be included in the final Clark County Regional Solid Waste System Study.

The walk-through assessment was conducted on September 24, 2019, by Doug Drennen and Krystal Li, P.E., of JRMA; and Michael Summers, P.E., of AKS Engineering and Forestry (AKS).

They were accompanied by Derek Ranta and Brian Treptow of Waste Connections. The assets listed on the next page were included in the walk-through assessment:

1. Transfer Station
2. HHW Building
3. Source-Separated Recycled Material Building
4. Scale House
5. Office
6. Site Access
7. Drive Aisles/Paved Areas
8. Sanitary Sewer Utilities
9. Stormwater Drainage Utilities
10. Domestic Water Utilities
11. Retaining Walls/Landscape Buffers

The assessment did not involve a detailed inspection of all building structural elements nor the site's civil-related assets. Limited as-built documents from the 1991 facility expansion were available for review. Destructive and non-destructive material testing and inspection were not performed. The following general information for each asset was determined based on a limited observation made during the site visit, limited as-built information, and conversations with facility staff.

1) Transfer Station

The Transfer Station is a pre-engineered metal building (PEMB) with a metal roof deck, metal siding, and concrete wainscot at the base. A compactor tunnel is located at the east end of the building. The tipping floor is constructed with reinforced concrete slab-on-grade. The following deficiencies were observed and should be addressed in the future.

- Three steel columns with warped column flange were observed along the north wall of the transfer building, shown in Figure 2 and Figure 3. The damage most likely was caused by loader impact. We recommend the warped column flange be reinforced soon.

Figure 2– Warped Column Flange

Figure 3 – Damaged Columns

- Areas of the existing metal siding (shown in Figure 4) were damaged. Although the damages are not considered structural, we recommend replacing the damagedsiding to prevent future structural damage.

Figure 4 – Transfer Station, Damaged Metal Siding

- Some hairline cracks and rust stains were observed in the exterior concrete wall surface, as seen in Figure 5.
- Exposed wall reinforcements at various locations were observed in the exterior concrete wall, also seen in Figure 5.

Figure 5 – Rust-Stained Exposed Reinforcements in Exterior Wall

- A damaged/spalled concrete abuse wall was observed near the entrance, as displayed in Figure 6.

Figure 6 – Damaged Concrete Near Entrance

- The concrete tipping floor with asphalt overlay, shown in Figure 7, is generally in **good** condition.

Figure 7 – Tipping Floor

- The concrete ramp in the tunnel (Figure 8) shows signs of wear.

Figure 8 – Concrete Ramp in the Tunnel

Recommendations

Our assessment revealed that the Transfer Station building is in **good** overall condition. We recommend the following improvements to the building:

- ✓ Repair the damaged steel column.
- ✓ Replace damaged metal siding.

2) HHW Building

The HHW building is a PEMB with a metal roof and metal siding on three sides. The floor is constructed with reinforced concrete slab-on-grade. The following deficiencies were observed.

- Damaged siding, as seen in Figure 9.

Figure 9 – Damaged Siding on HHW Building

Recommendations

Our assessment revealed that the HHW is in **good** overall condition. Our recommendation is to:

- ✓ Replace damaged siding.

3) Recycling Building

The Recycling Building is a PEMB and was the original building on the site. The floor is constructed with reinforced concrete slab-on-grade. The following deficiencies were observed.

- Damaged concrete piers supporting building columns, as displayed in Figure 10 on the next page.

Figure 10 – Damaged Pier Supports on Recycling Building

- Cracked concrete abuse wall, as shown in Figure 11.

Figure 11– Cracked Concrete Wall

- Warped steel column flanges (Figure 12).

Figure 12 – Warped Steel Column Flanges

- Cracked concrete floor (Figure 13).

Figure 13 – Recycling Building's Cracked Floor

- Rusted steel wall panels and wall girts (Figure 14).

Figure 14 – Recycling Building Wall Panels

- Buckled steel rod brace (Figure 15)

Figure 15 – Buckled Steel Wall Brace

Recommendations

Our assessment revealed that the Recycling Building is in **poor** overall condition. We recommend the following improvements to the building:

- ✓ Repair damaged columns
- ✓ Replace the damaged and rusted steel panels and secondary members
- ✓ Repair damaged concrete supports and abuse wall.
- ✓ Seal cracked floor.

4) Scale House and Booth

According to the facility operator, the scale house (pictured in Figure 16) and the booth are scheduled to be replaced soon. Therefore, no assessment was performed on these buildings.

Figure 16 – Scale House

5) Administrative Building

The administrative building (Figure 17) is a modular building with a metal roof and metal siding.

No obvious structural deficiencies were observed.

Figure 17 – Administrative Building

Recommendations

Our assessment revealed that the Administrative Building is in **fair** overall condition. No structural repair is recommended.

6) Site Access

CRT is accessed from Northeast 117th Avenue (State Route 503), a Washington Department of Transportation highway. The site access is a concrete driveway approach at the highway. The remainder of the drive aisle to the interior of the site is paved with asphalt. The access is constrained on both the north and south sides by neighboring site improvements and franchise utility infrastructure along both sides of the driveway approach.

- The concrete driveway approach (Figure 18) is in **fair** condition and includes a depressed curb with a lip and a concrete sidewalk.

Figure 18– Concrete Driveway Approach Access

7) Drive Aisles and Paved Areas

The drive aisles that course through the site are paved with asphalt concrete pavement. The as-built depth of the pavement is unknown. Some areas require rehabilitation in various portions of the facility, mainly along the eastern drive aisle of the solid waste transfer station.

- This section of pavement along the eastern drive aisle (Figure 19 on the next page) shows significant deterioration of the wearing surface and is in **poor** condition. This pavement section shows significant wear and cracking by the eastern landscape buffer, which is a 3- to 4-foot-wide landscape strip with 12- to 16-inch evergreen trees spaced every 10–15 feet.

Figure 19 – Pavement Along Eastern Drive Aisle

- There is a continuous length of concrete extruded curb on the top of the asphalt pavement section that bounds the landscape strip. This extruded curb (Figure 20) is in **poor** condition due to buckling and cracking from the adjacent trees and tree roots.

Figure 20 – Concrete Extruded Curb

8) Sanitary Sewer Utilities

The facility is served by public sanitary sewer within Northeast 117th Avenue. The sewer purveyor is Clark Regional Wastewater District (CRWWD). The onsite sewer collection system is a gravity system that serves the interior drains for the solid waste, recycling, and office buildings. The scale house and drain also are served by the onsite gravity system. Due to the terrain of the site, the gravity sewer system is collected to a central sanitary sewer private pump station located in the interior of the site. The pump station discharges via a pressure force main to a gravity lateral that resides in the site access at Northeast 117th Avenue. The pump station is a duplex pump system with two pumps that alternate pumping discharge of the sanitary sewer effluent.

- According to facility staff, one of the pumps failed in September 2019, but it was replaced in the fall of 2019.

9) Stormwater Drainage Utilities

The CTR facility was constructed circa 1991. The stormwater infrastructure includes a gravity collection system for drive aisles and structure roof drains that collect stormwater runoff. As originally designed runoff was conveyed to settling ponds, then through an oil/water separator, and then to an underground infiltration facility, which consists of a series of perforated drainpipes surrounded by drain rock that allows the runoff to infiltrate into the ground. Stormwater does not discharge offsite from this facility.

The stormwater system was upgraded in 2017 and 2018 to enlarge the stormwater infiltration basin and improve collection. The plans for the stormwater facility upgrade were not available as part of this assessment. The upgraded stormwater system includes an infiltration basin component (pictured in Figure 21) that provides infiltration below ground into the underlying subgrade. As part of the 2017 and 2018 construction, the initial infiltration pipe system was removed because it was no longer functional.

Figure 21 – Stormwater Runoff

The facility is in **good** condition, based on our visual observation and anecdotal discussion with Waste Connections staff. No design plans were available for review during our site visit. If the design plans for the storm facility upgrade were available, along with operations and maintenance records, a more refined assessment could occur.

10) _Domestic Water Utilities

The CTR Facility is served with domestic water by Clark Public Utilities. The onsite facility is a public system that is owned and maintained by Clark Public Utilities. The domestic water facilities were not assessed as part of this report.

11) Retaining Walls and Landscape Buffers

The boundary of CTR contains a combination of landscape buffers or landscape and wall buffers. The east and south buffers are a combination modular block wall, approximately 8 to 10 feet tall, and evergreen trees.

- The north boundary is a landscape buffer with evergreen trees and shrubs and is in **good** condition.
- The south boundary buffer is in **good** condition.
- The east boundary buffer (Figure 22) is in **poor** condition due to trees and tree roots impacting the pavement section and curb.

Figure 22 – Stormwater Runoff

Conclusion and Recommendations

Our limited structural and site improvement conditions assessment reveals most of the assets at the site are in relatively fair-to-good condition, except for the recycling building, areas of pavement, the east boundary retaining wall, and the infiltration portion of the stormwater system.

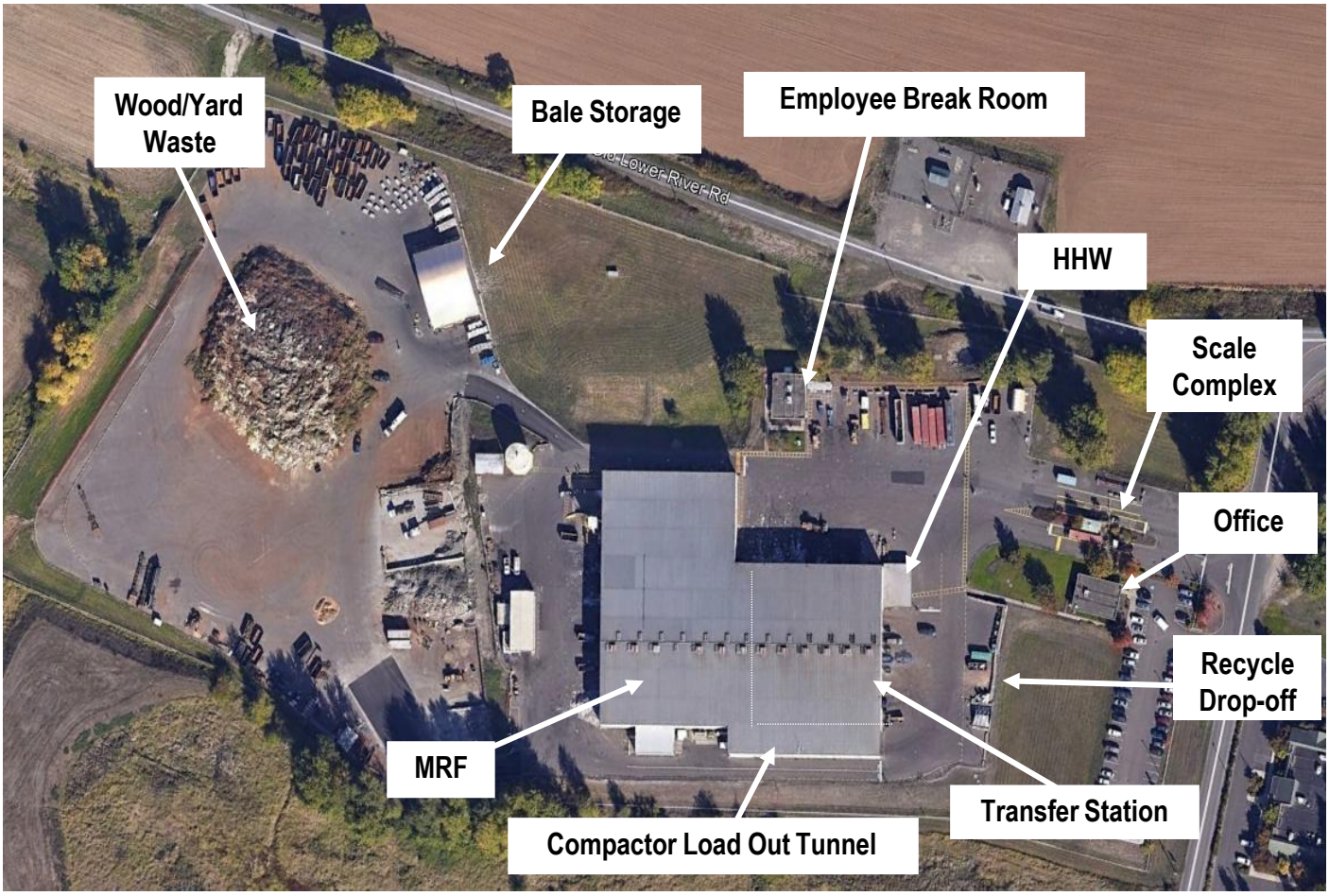
- The transfer station and HHW building, the north boundary retaining wall, and the south boundary retaining wall are generally in **good** overall condition.
- The recycling building next to the HHW building is in relatively **poor** condition. We observed a deteriorated roof and wall panels and secondary framing members as well as a cracked concrete floor and a damaged concrete wall. The rusted panels and the rusted secondary framing members are most likely caused by water infiltration. Localized repair or reconstruction should be expected. We recommend that a detailed structural investigation be implemented as part of the planning process.
- The drive aisles that course through the site are paved with asphalt concrete pavement.
- Areas of the paving are in very **poor** condition that require rehabilitation. The problem areas are in various portions of the facility, mainly along the eastern drive aisle of the solid waste transfer building. We recommend the worn surface areas be repaired or replaced.
- The east boundary buffer is in **poor** condition due to trees and tree roots impacting the pavement section and curb. The pavement section and the damaged curb should be repaired or replaced.
- The stormwater system was constructed circa 1991 and was upgraded circa 2017 in response to updated regulations and the deficient infiltration facility. The facility is in fair condition based on our visual observation and anecdotal discussion with Waste Connections staff.
- The existing pump station for the sanitary sewer system is a duplex pump system with two pumps that alternate pumping discharge of the sanitary sewer effluent. According to facility staff, one of the pumps failed in September 2019 and was replaced in the fall of 2019. The pump station is in **good** condition.
- The scale house and the scale booth were not assessed since they will be replaced soon.
- Also, the domestic water system was not assessed since it is owned and maintained by Clark Public Utilities.
- Our structural and civil conditions assessments were limited to those areas that are readily accessible and visible to field staff. Concealed conditions that become exposed in the future maychange our current recommendations made here.

Appendix C - West Van Conditions Assessment

Limited Structural and Exterior Site Improvement Conditions Assessment, West Vancouver Transfer and Recycling Facility

Clark County's West Vancouver Material Recovery (WVAN) facility is a privately owned solid waste facility. It is the secondary solid waste facility in the Clark County regional system. WVAN also served as the primary material recovery facility (MRF) for all commercial and residential recyclables collected throughout the county. The facility opened in 1993 and is located within the city limits of Vancouver. The address of the facility is 6601 NW Old Lower River Road, Vancouver, Washington. An aerial view of the facility is shown in Figure 1.

Figure 23: Aerial View of Clark County WVAN



The facility consists of an upper and lower yard. The upper yard consists of the process building and other service building structures to support the operations of the facility. Within the process, the building is a material handling system that sorts recyclable materials. The upper yard vehicle entrance has in-bound and out-bound large truck scales with scale house and booth. There is an administrative office building and employee building with a locker room and break room. The upper yard structures are surrounded by paved drive aisles to support vehicle maneuvering for material handling and general facility operations. The upper yard pavement is sloped to a series of catch basin inlets to collect runoff and drain to the north around the structures. Stormwater is conveyed to a large biofiltration water-quality swale for runoff treatment. There is a stormwater oil/water separator for oil control before the discharge of stormwater into the large biofiltration swale.The structures are served with domestic sewer with an onsite septic system with a septic tank anddrain field.

The lower yard is a large, paved area surrounded by a concrete curb. The lower yard is an outdoor storage area for wood waste, glass recycling, concrete rubble, and a recycling storage shelter. The pavement is sloped toward the northwest to a low point in the curb. The low point drains into a stormwater detention pond at the northwest corner of the site. The detention pond discharges stormwater into a biofiltration water quality swale.

The County commissioned JRMA to conduct an overall facility existing conditions review as part of Task 6 of the Clark County Regional Solid Waste System Study's scope of work. The goal of this assessment is to observe, determine the condition of theassets, and make rehabilitation recommendations. This document summarizes our assessment findings and will be included in the final Clark County Regional Solid Waste System Study.

The walk-through assessment was conducted on February 11, 2020, by Doug Drennen and Krystal Li, PE, of JRMA; Rick Kattar of Swordfish; and Michael Summers, PE, of AKS Engineering and Forestry (AKS). They were accompanied by Yuta Naganuma, Quinn Gonder, and Derek Ranta of Waste Connections of Washington (WCW). The following assets were included in the walk-through assessment:

1. Process Building
2. Scale House and Scales
3. Administration Office
4. Employee Facility
5. Recycling Shelter
6. Pump House
7. Maintenance Building
8. Used Oil Storage
9. Upper Yard
10. Lower Yard
11. Storm Facilities Sanitary
12. Water
13. Sanitary

The assessment did not involve a detailed inspection of all building structural elements nor the site civil-related assets. Limited as-built documents were available for review. Destructive and non-destructive material testing and inspection were not performed. The following general information for each asset was determined based on an observation made during the site visit, limitedas-built information, and conversations with facility staff.

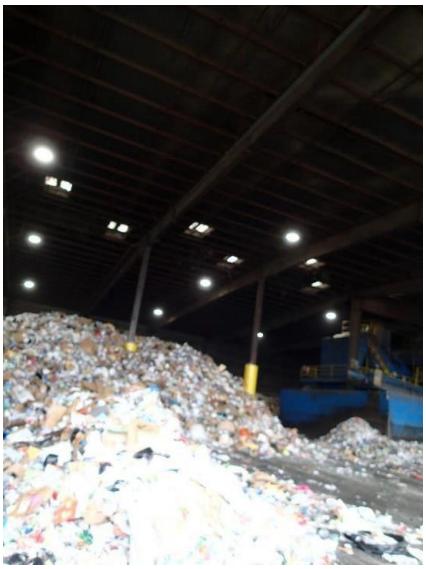
12) Process Building

The process building (Figure 2) is an 82,000 sf PEMB with a metal roof deck, metal siding, and a 12-foot-tall concrete masonry unit (CMU) abuse wall at the base. The floor is constructed with reinforced concrete slab on grade and is protected with asphalt overlay. The building itself is supported by solid grouted steel piles that are 100 to 110 feet long.The rigid frames span in a north-south direction with interior support columns.

Figure 2: Process Building

Some of the interior columns were replaced recently with new steel columns with a concrete encasement, as shown in Figure 3.

Figure 3: Recently Replaced Interior Columns with Concrete Encasement



The processing building is in overall fair condition. The following conditions were observed.

- Structural frames are in good condition, as shown in Figure 4, except for the columns located next to the rollup doors and the compactor, as shown in Figures 5–10. It should be noted that the damage on the Bay 8 column (Figures 7 and 8) was repaired since the site visit.

Figure 4: Structural Steel Frames in Good Condition

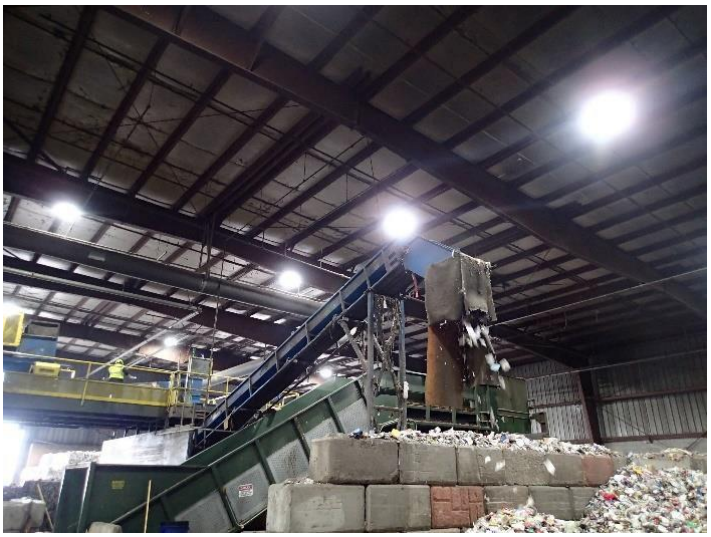


Figure 5: Damaged Column at Public Unloading Bays

Figure 6: Damaged Column Flange at Commercial Unloading Bays

Figure 7: Recently Damaged Column, Abuse Wall, and Bollard at Bay 8 (Repaired)

Figure 8: Recently Damaged Column, Abuse Wall, and Bollard at Bay 8 (Repaired)

Figure 10: Damaged Rollup Door at Bay 12

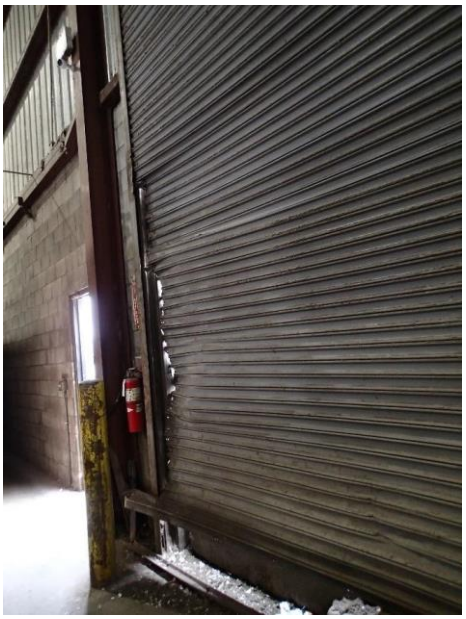


Figure 9: Damaged Column at Compactor Bay

- The concrete floor (Figures 11–13) with the wearing surface is in fair condition. No exposed floor reinforcing was observed.

Figure 11: Concrete Floor in the Commercial Bays

Figure 12: Floor in the Public Unloading Area

Figure 13: Floor in the Bale Storage Area

- Metal siding are generally in **fair** condition except for areas near the public and commercial unloading areas that are in **poor** condition, as shown in Figure 14.

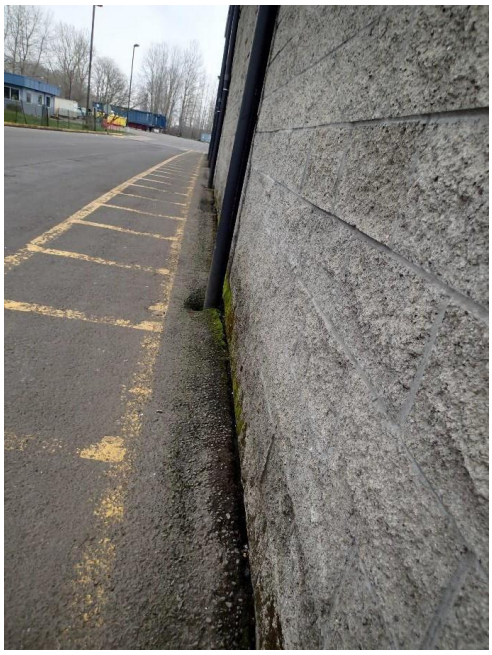
Figure 14: Damaged Siding

- Exterior CMU abuse walls are generally in **good** condition, as shown in Figure 15.

Figure 15: Exterior CMU Abuse Wall

- Settlement issues were observed around the exterior of the building, as shown in Figure 16.

Figure 16: Signs of Settlement



Recommendations

Our assessment revealed that the process building is in **fair** overall condition. We make the following recommendations for improvements to the building:

- ✓ Repair the damaged columns (short-term repair)
- ✓ Replace the damaged siding
- ✓ Replace the damaged rollup door at Bay 12

13) Scale House, Scale Booth, and the Scales

The scale house and the scales (Figures 17 and 18) are in **good** condition

Figure 17: Scale House

Figure 18: Scale House and Scale

Recommendations

Our assessment revealed that the scale house and the scale booth are in **good** overall condition.
Our recommendation is:

- ✓ None

14) Scale House, Scale Booth, and the Scales

The administrative building (Figure 19) is a prefab modular building. No obvious structuraldeficiencies were observed

. ***Figure 19: Administrative Building***

- Localized old water stains were observed on ceiling tiles, as shown in Figure 20.

Figure 20: Water Stains on Ceiling Tiles

Recommendations

Our assessment revealed that the Administration Building is in **fair** overall condition. Our recommendation is:

- ✓ None

15) Employee Facility

The employee facility (Figure 21) is a prefab modular building. No obvious structural deficiencies were observed.

Figure 21: Employee Facility

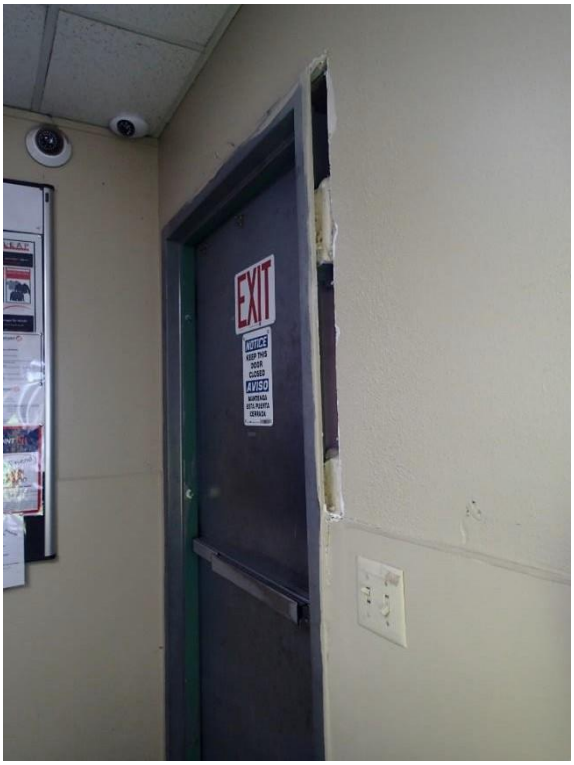
.

- Some old water stains were observed on the ceiling tiles, shown in Figure 22, and some ceilingtiles were loose

Figure 22: Ceiling Tiles

- A hole in the interior wall was also observed, as shown in Figure 23

Figure 23: Hole in Wall



Recommendations

Our assessment revealed that the administrative building is in **fair** overall condition. No visible structural damages were observed. Localized water stains, loose ceiling tiles, and a hole in the wall were observed. Our recommendation is to:

- ✓ Replace stained ceiling tiles and pop loose tiles into place
- ✓ Patch the hole in the wall

16) Recycling Shelter

The recycling shelter (Figure 24) is a fabric structure located in the lower yard area. The structure is generally in good condition.

Figure 244: Recycling Shelter

Recommendations

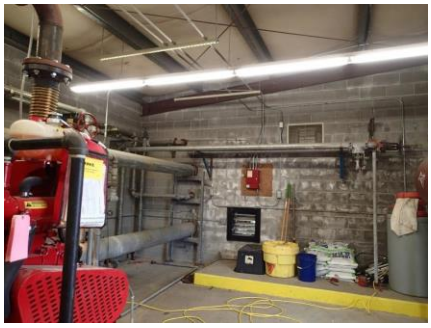
Our assessment revealed that the recycling shelter is in **good** overall condition. Our recommendation is:

- ✓ None

17) Pump House

The pump house (Figure 25) is a CMU building. The structure is generally in **good** condition.

Figure 25: Pump House



Recommendations

Our assessment revealed that the pump house is in **good** overall condition. Our recommendation is:

- ✓ None

18) Maintenance Building

The maintenance building (Figure 26) is a PEMB with a metal roof panel, metal siding, and a CMUabuse wall at the lower part of the exterior wall. The structure is generally in **fair** condition.

Figure 26: Maintenance Building

- Areas of siding show signs of damage, as shown in Figure 27

Figure 27: Damaged Siding Above the Rollup Door

Recommendations

Our assessment revealed that the maintenance building is in **fair** overall condition. Areas of sidings show signs of damage. Our recommendation is to:

- ✓ Repair damaged siding

19) Used Oil Storage Facility

The used oil storage facility (Figures 28 and 29) is a PEMB with a metal roof deck and metal siding. The structure is generally in **good** condition.

Figure 28: Used Oil Storage Facility

Figure 29: Interior of Used Oil Storage Facility

Recommendations

Our assessment revealed that the used oil facility is in **good** overall condition. Our recommendation is:

- ✓ None

20) Upper Yard

The upper yard pavement (Figure 30) has some wear in various portions of the drive aisle areas. Most of the wear in paved areas consists of areas where large trucks make turning movements.

Figure 30: Upper Yard Pavement

Other areas of pavement wear are located west of the process building, where material handling equipment traverses the drive aisles. In general, the pavement is in **fair** condition except for the maneuvering areas and the drive aisle at north and west of the process building that are in **poor** condition, see Figures 30 and 31.

Figure 31: Paved Area North of Process Building

Recommendations

Our assessment revealed that the upper yard pavement is in **fair** condition except for the maneuvering areas and the drive aisle at the north and west of the process building. Those areas are in **poor** condition.

Our recommendation is to:

- ✓ Repair or replace the worn pavement in maneuvering areas and the drive aisle west of the process building

21) Lower Yard

The lower yard pavement (Figure 32) has wear in the center of the lower yard paved area, mainly where large trucks and material handling equipment make turning movements.

Figure 32: Lower Yard Pavement

Recommendations

Our assessment revealed that the lower yard is in **fair** overall condition except for the large trucks and equipment maneuvering areas, which are in **poor** condition. Our recommendation is to:

- ✓ Replace the worn pavement surface and base aggregate as required

22)Stormwater Facilities

The stormwater facilities are separated into upper- and lower-yard facilities.

- The upper yard bio-filtration stormwater facility (Figure 33) is in **good** condition.
- The oil/water separator within the upper yard facility was not assessed as part of this report.
- The lower yard facility (Figure 34) is in **good** condition as well.

The operations and maintenance staff regularly keep the exterior paved areas clean and clear of recyclables and debris, which aids in keeping debris out of the stormwater facilities.

Figure 33: Upper Yard Swale

Figure 34: Lower Yard Swale

<u>Recommendations</u>

Our assessment revealed that the stormwater facilities are in **good** overall condition. Our recommendation is:

- ✓ None

23) Sanitary System

The onsite sanitary system was not assessed with this report, yet anecdotal information from the operator indicates the system is functioning appropriately with no issues.

Recommendations

The onsite septic system was not assessed. According to the operator, the system is functioning appropriately. Our recommendation is:

- ✓ None

24) Water

Water facilities around the site were not assessed, because most of the domestic water infrastructure at this facility is public water infrastructure owned and maintained by the City of Vancouver.

Recommendations

Water facilities were not assessed.

Conclusion and Recommendations

Our limited structural and site improvement conditions assessment reveals that most of the assets at the site are in good condition. Areas of pavement are in fair condition.

- The process building is in **fair** condition. Many columns in the public unloading and commercial unloading areas were damaged. The column damages are considered structural and should be repaired soon. Siding near the public and commercial unloading bays was damaged. The damage is not structural in nature. However, the damaged siding should be repaired to prevent any potential corrosion problems due to moisture penetration.
- The scale house and scales, recycling shelter, pump house, and used oil storage facility are in **good** overall condition. No short-term action is needed. The administrative building, employee facility, and maintenance building are in **fair** overall condition. No short-term action is needed.
- The upper yard and lower yard areas are paved with asphalt concrete pavement. In general, the paving is in **fair** condition except for in heavy traffic areas, which are in **poor** condition. We recommend the worn surface areas be repaired or replaced.
- The stormwater facilities are in overall **good** condition. No short-term action is needed.

The sanitary system and the water system were not assessed. Therefore, no recommendations are made. Our structural and civil conditions assessments were limited to those areas that are readily accessible and visible to field staff. Concealed conditions that become exposed in the future maychange our current recommendations

Appendix D – Washougal Conditions Assessment

Limited Structural and Exterior Site Improvement Conditions Assessment, WashougalTransfer Station

Clark County Washougal Transfer Station (WTR) is a privately owned solid waste transfer station. It is the primary solid waste handling facility for route truck deliveries from the cities of Washougal and Camas as well as for self-haul use on a limited schedule. The facility was constructed in 2008–2009 and is located within the city limits of the City of Washougal on about 4.5 acres. The address of the facility is 4020 S. Grant Street, Washougal, Washington. An aerial view of the facility is shown in Figure 1.

Figure 25: Aerial View of Clark County WTR

The facility includes a transfer station, a household hazardous waste (HHW) facility, a public recycling area, a scale plaza, and an administration office. The transfer station is a three-bay building with a single lift-and-load trailer-loading bay on the east side of the building. The HHW building is a drive-through canopy with a secured storage area for citizens to drop off HHW material. The recycling area consists of drop boxes on a concrete slab on grade without a canopy. The scale plaza has an inbound and an outbound vehicular truck scale and a scale house. There is a modular administration office on-site as well.

The facility has various areas of asphalt pavement that provide vehicle maneuvering areas for large trucks and community members using the facility. There is a gravel storage area within the center of the site that is used for large trailer storage. Sanitary sewer is collected from the administrative office and transfer station. The sewer discharges through a coalescing plate oil/water separator before discharging into the public sewer system within Grant Street. The stormwater runoff of the roof area and paved areas is collected via a series of stormwater catch basin inlets. The catch basin inlets drain into a biofiltration swale for water quality treatment.

The County commissioned JRMA to conduct an overall facility existing condition review as part of Task 6 of the Clark County Regional Solid Waste System Study's scope of work. The goal of this assessment is to observe, determine the condition of the assets, and make rehabilitation recommendations. This document summarizes our assessment findings and will be included in the final Clark County Regional Solid Waste System Study.

The walk-through assessment was conducted on February 12, 2020, by Doug Drennen and Krystal Li, PE, of JRMA; and Michael Summers, PE, of AKS Engineering and Forestry (AKS). They were accompanied by Yuta Naganuma and Jeff Smith of Waste Connections of Washington (WCW). The assets listed on the next page were included in the walk-through assessment:

1. Transfer Station
2. HHW Canopy
3. Scale House
4. Administration Office
5. Transfer Station Vehicle Maneuvering Area
6. Gravel Storage Area
7. Public Recycling Area
8. Storm Facilities
9. Sanitary
10. Water

The assessment did not involve a detailed inspection of all building structural elements nor the site civil-related assets. Limited as-built documents were available for review. Destructive and non-destructive material testing and inspection were not performed. The following general information for each asset was determined based on a limited observation made during the site visit, limited as-built information, and conversations with facility staff.

25) Transfer Station

The transfer station, shown in Figure 2, is a pre-engineered metal building (PEMB) with a metal roof deck and metal siding. A lift-and-load partial tunnel is located at the east end of the building. The tipping floor is constructed with reinforced concrete slab-on-grade. The building columns are protected by steel push walls or steel bollards.

Figure 2: Three-Bay Transfer Station

The transfer station is in overall **good** condition. The following conditions were observed.

- Structural frames (Figure 3) are in good condition. No obvious damage was observed.

Figure 3: Structural Steel Frames

- The concrete floor (Figure 4) is in fair to good condition. No exposed floor reinforcing was observed.

Figure 4: Concrete Floor

- The metal roof deck and metal siding are generally in **good** condition, except for the siding located immediately behind the lift-and-load trailer area, as shown in Figure 5. The damage is mainly due to the waste loading operation. JRMA recommends adding a "trash deflector" to the backside of the partial tunnel to guide the waste material into the trailer while loading.

Figure 5: Damaged Siding

- The concrete walls and floor in the partial tunnel (Figure 6) are in good condition.

Figure 6: Partial Tunnel

Recommendations

Our assessment revealed that the transfer station building is in **good** overall condition. We make the following recommendations for improvements to the building:

- ✓ Replace the damaged siding
- ✓ Add trash deflector around the lift-and-load area to protect the metal siding

26) HHW Facility

The HHW facility is a PEMB with a metal roof and partial metal siding. The floor is constructed with reinforced concrete slab-on-grade. The canopy and the concrete slab (Figures 7 and 8) are in good condition.

Figure 7: HHW Canopy and Concrete Slab

Figure 8: HHW Canopy

Recommendations

Our assessment revealed that the HHW building is in **good** overall condition. Our recommendation is to:

- ✓ None

27) Scale House and Scales

The scale house and the scales (Figure 9) are in good condition.

Figure 9: Scale House and Scales

Recommendations

Our assessment revealed that the scale house and the scales are in **good** overall condition. Our recommendation is to:

- ✓ None

28) Administrative Building

The administrative building (Figure **17** 10) is a modular building with a three-ply roof and HardieBoard siding. No obvious structural deficiencies were observed.

Figure 10: Administrative Building

Recommendations

Our assessment revealed that the administration building is in **good** overall condition. Our recommendation is to:

- ✓ None

29) Transfer Station Vehicle Maneuvering Area

The drive aisles that course through the site are paved with asphalt concrete pavement. The as-built depth of the pavement is unknown. There are various areas of the paved drive aisles that are showing wear, as shown in Figures 11 and 12. The areas of wear are mainly in the vehicle maneuvering areas for large trucks. The pavement surface is generally in good condition with some areas in fair condition.

Figure 11: Paved Areas in Front of the Transfer Station

Figure 12: Cracked Pavement at Transfer Truck Exit

Recommendations

Our assessment revealed that the transfer station vehicle maneuvering area is in **good** overall condition with areas in **fair** condition. Our recommendation is to:

- ✓ Repair the worn paved surface as required

30) Gravel Storage Area

The gravel storage area (Figure 13) is in good condition. With a visual inspection, the gravel appeared to be regularly maintained with grading and compaction of maintenance rock.

Figure 13: Gravel Storage Area

Recommendations

Our assessment revealed that the gravel storage area is in **good** overall condition. Our recommendation is to:

- ✓ None

31) Public Recycling Area

The public recycling area is adjacent to the HHW building along the north boundary of the site. The container bins for this area are on a concrete pavement surface, while the drive-through areas for public traffic are asphalt pavement areas. There is some cracking in the concrete pavement, shown in Figure 14, at the joint of the pavement and transition with the asphalt pavement.

Figure 14: Cracked Pavement at Public Recycling Area

Recommendations

Our assessment revealed that the public recycling area is in **good** overall condition. Our recommendation is to:

- ✓ Repair cracked paved surface as required

32) Stormwater Facilities

The stormwater facility is in good condition. The biofiltration swale (Figure 15) is in good condition with regular maintenance of the grassed vegetation. The biofiltration swale begins with a sediment trap or concrete box to capture sediment. The sediment trap is in good condition as well.

Figure 15: Swale

Recommendations

Our assessment revealed that the stormwater facilities are in **good** overall condition. Our recommendation is to:

- ✓ None

33) Sanitary System

The sanitary sewer facilities onsite are in good condition. The coalescing plate oil/water separator has convenient access with a traffic-rated lid. The plates and interior baffles are kept clean with regular maintenance and are in good condition.

Recommendations

Our assessment revealed that the sanitary system is in **good** overall condition. Our recommendation is to:

- ✓ None

34) Water

The facility is served with domestic water and has a fire water system for the transfer station building. There is a fire hydrant located adjacent to the administrative office structure that appears in good condition. The fire riser room in the rear of the transfer station was conveniently accessible and in clean, good condition.

Recommendations

Our assessment revealed that the water system is in **good** overall condition. Our recommendation is to:

- ✓ None

Conclusion and Recommendations

Our limited structural and site improvement conditions assessment reveals most of the assets at the site are in good condition except areas of pavement, which are in fair condition.

- The transfer station is in **good** condition. Siding damage behind the trailer lift-and-load area was observed. The damage is not structural in nature. However, the damaged siding should be repaired to prevent potential corrosion problems due to moisture penetration.
- The HHW canopy, the scale house, and administration office are in **good** overall condition. No short-term action is needed.
- The gravel storage area is in **good** condition. No short-term action is needed.
- The public recycling area is in **good** condition. Small areas of cracked pavement were observed. No short-term action is needed. The cracked pavement should be repaired in the future. The drive aisles that course through the site are paved with asphalt concrete pavement. In general, the paving is in **good** condition except for in the truck maneuvering areas. Werecommend the worn surface areas be repaired or replaced.
- The storm facilities, the sanitary system, and the water system are in overall **good** condition. No short-term action is needed.

Our structural and civil conditions assessments were limited to those areas that are readily accessible and visible to field staff. Concealed conditions that become exposed in the future may change our current recommendations made here.

Appendix E – MRF Conditions Assessment

Waste Connections Material Recovery FacilityClark County, Vancouver, WA
Equipment Condition Assessment
February 15, 2020

Swordfish
Consulting Services

Mr. Doug Drennen, PE

JRMA Architects

Engineers14206 NE

102nd Street Vancouver,

WA 98682

RE: Waste Connections MRF Equipment Condition Assessment

Dear Mr. Drennen:

Thank you for the opportunity to work with your firm regarding the equipment condition assessment ofthe Material Recovery Facility that serves Clark County.

Our site visit and inspection were completed in two days during the week of February 10th. During thistime the operator, Waste Connections, gave us complete access to the plant and the freedom to interact with MRF staff members including sorters, equipment operators, maintenance team, and managers. The Maintenance Manager was very engaged in the process and was most helpful.

The plant has been processing since 1992 with a major retrofit completed in or around 2008 and it is inremarkably good shape. The balers, process system conveyors, and components are functioning as designed although at much lower run rates than originally designed. The plant equipment is in good operating condition; however, it is relatively inefficient by comparison to current systems that employ the latest applications of screening, robotics, optical sorting, and air classification technologies.

Although MRF operational practices were not a direct component of our equipment assessment,observations that were made during the inspection process that impacted system equipment functionality and related product outputs are included in this report.

JRMA
ARCHITECTS ENGINEERS

Since 1992, Swordfish Consulting personnel have served the recycling industry managing operations designing equipment processing systems, managing equipment retrofits, and turning around strugglingrecycling operations. The insights we have gained during the past 28 years have been applied to the following equipment condition assessment.

Sincerely,

Richard Kattar

Principle and Managing

Director Swordfish Consulting

Services, Inc.

Presented to:

JRMA Architects Engineers

Submitted by:

Swordfish Consulting Services,

Inc.

Recycling Management Services and Production System Development1589 Blackwood Ct, Erie, CO 80516

303-589-5864

February 15, 2020

Table of Contents

1. PROJECT OVERVIEW

Swordfish Consulting Services, Inc. (SFC) conducted an Equipment Condition Assessment of the recycling processing system at the Waste Connections Material Recovery Facility (WCMRF) in Vancouver, WA. SFC inspected the entire processing system observing all components while idle andwhile processing in order to assess current operational condition.

The SFC team consisted of Richard Kattar, who was on site Tuesday, February 11, and Wednesday, February 12, 2020. Day 1 of the inspection process we completed a team introduction and received a business and operations briefing from the Waste Connections' leader team. This was proceeded by a plant and site walk through with the Maintenance Manager.

Preparation for the inspection included:

a. review of 1992 and 2008 system as-built drawings,
b. review of plant operations with Lead-Point team leaders (Lead-Point supplies all sorter labor forthe plant),
c. review of plant program material composition,
d. review of current state plant production statistics,
e. review of maintenance costing data provided by WCMRF.

Day 1 we focused on understanding the basics, system design, inbound material volume and composition, flow of material through each workstation, and the outputs of each system component. Our initial objective was to understand what production throughput-burdens the system was experiencing at the observed run rate. The system is rated to process at between 27 and32 tons per production run hour without glass. As observed, we guesstimate that the run rate was approximately 20 tons per production run hour. The operating team later confirmed an 18 to 20 ton per production run hour performance level. Once we understood the actual system production run rate, we could better determine equipment functionality. At the time of our inspection, it appeared that all manned critical system sorting positions were occupied and product quality was exceptional.

Day 2 our focus was on system equipment condition and functionality at the current production runrate. Each component was observed during different times of the inspection period to assure we noted operations with different composition flows. Observing each component input and output tells us how well each component handles product flow and usually exposes process bottle necks which effect quality. We also spent time with the sorting team leaders to get a feel for material flow and related production issues and mechanical challenges. The sorting team has great knowledge of the plant's operating challenges including component mechanical challenges.

2. SCOPE OF WORK: Conduct WCMRF Equipment Condition Assessment

The WCMRF equipment condition assessment included an inspection of all system mechanical, electrical, and hydraulic components for evaluation of current state condition and operational functionality. In our review we focused primarily on fixed equipment. All rolling stock appeared to be operating well and fit the application they were dedicated to perform. The following apparatus was included in the inspection and evaluation:

1. Drum feeder
2. Conveyor chassis
3. Shafts
4. Bearings
5. Motors/gear boxes
6. Equipment support structure
7. Head and tail pulleys
8. Disc screens
9. Vibratory screens
10. Belts and belt splices
11. Magnet
12. Eddy-current
13. Slider beds
14. Return rollers
15. Balers
16. Dust control system

3. WCMRF EQUIPMENT INSPECTION

A. Existing Equipment Condition Report
The operational condition along with comments are described in Table 1 below. Photographic and video presentation of certain components are presented as exhibits.

TABLE 1

EQUIPMENT	CONDITION	COMMENTS
Drum Feeder and Take-away Conveyance	Good operational condition	Narrow drum feeder and product conveyance away. Wider units would reduce burden depth and material surging.

General Conveyor Chassis	All conveyor chassis inspected were in good operational condition.	Original Harris baler (Gorilla) chain conveyor would benefit by more regular lubrication. Conveyor PIT drainage may be problematic. Auto oiler may be appropriate.
Shafts	All shafts appeared in good working condition.	Inspection was not completed with guards removed. General note that guarding was very robust throughout the plant.
Bearings	All bearings observed were in operating condition, free of wrap with Zerks in place and used.	No comment
Motors/Gear boxes	All motors and gear boxes appeared in good working condition.	All gear boxes inspected were cool to the touch. Most motors were free of dust and debris. No motors were observed rocking.
Equipment Support Structure supports	All equipment appeared to be in good shape.	We observed no excess vibration or platform swaying. We did not observe any structural damage that appeared to be problematic.

Head and Tail Pulleys	All head and tail pulleys appeared in good operational condition.	We observed no excess buildup orwrap on any pulleys.
Disc Screens	All screens were in good operating shape. Scalping screen, 2-inch screen, newspaper screens 1, 2, and 3 were all screening properly. Cardboard screenis old with wide spacing.	This is where we advise operators to begin planning for newer screening technology. Reduced wrapping disk screens and ballisticscreens are all better than currentstate. The operator indicated that the cardboard screen was being replaced with a new Machinex tight-spaced 2-deck screen.
Vibratory Screen	The container line metering vibratory screenwas functioning as designed.	The current screen is not effectivewith the changing stream composition. A ballistic screen would provide better fiber/container screening and would provide a clean flow to future container line optics or robotics.
Belts and belt splicing	Most belts were in good operating shape. Many ofthe widescreen feeding belts could use better under supports or tightening.	We observed several wide feed belts operating in such a way as toaccelerate wear. Some belts were observed that could be better tracked to center. These were worn belts that may be planned toreplace soon. Replacing belts that have worn cleats will help mitigate process flow surging and missed sorts on the container line.
Magnet	The magnet was observedto be operating as designed.	The magnet appears old, and a newer unit might provide more yield at higher designed run rates

Eddy-Current	The eddy-current was observed to be operating as designed.	This is a small and under-designed unit for the system and its current produced composition. A wider and more powerful unit should be explored in the near future. Robotics quality control (QC) on the aluminum QC sort line should be explored.
Slider Beds (associated with most sorting conveyors)	Slider beds that we were able to observe all appeared in good shape.	WCMRF maintenance team indicated that they have been rebuilding most beds. The older original 1992 sort line conveyors and belts are all ready for change out.
Return Rollers	All return rollers observed were in good working order. No major wrap was observed.	Very good sign as wrap leads to belt wear and downtime.
Balers – Harris Gorilla and Centurion 2 Ram	The 2 balers both appeared in good working condition. Wire tie systems are always a challenge in an MRF, and they appeared normal.	Baler infeed conveyors appeared in working order. Obvious water impact was observed. It appears that the chain conveyors could use more lubrication. WCMRF maintenance indicated that relines were completed on both balers recently.
Dust Control Systems	The plant dust mitigation system appeared to be working as designed.	Good stuff for employee comfort and fire prevention. Also big regarding bearing wear.

B. Assessment of Current Equipment Maintenance Practices

With consideration of the age of the system and the environment the equipment is operating, the WCMRF is in good operating condition and is not burdened by excessive downtime and system bottle necks. We would grade maintenance practices as better than average. The maintenance team appears very engaged and was actively part of assuring smooth operations. The maintenance shop is well equipped and organized. The task board was observed to have scheduled PMs identified for the day as well as notes regarding potential issues. The Maintenance Manager indicated that they were working to employ a computerized maintenance management system (CMMS) in the near future. This would be very important going forward with future equipment enhancements like optics and robotics.

C. Useful Life Protection

The system, though fully functional and in good operating condition, is several generations behind current technology and, by comparison, relatively inefficient. The plant's current reduced production run rates are directly correlated to the huge material composition changes realized over the past 10 years and the current technology employed to process it. While newspaper generation continues its decline, cardboard composition has dramatically increased, challenging most traditional paper screening machines. In the short term (2-4 years), the plant should consider continuing its current practice of targeted component replacements. The cardboard screen is scheduled for replacement soon. We recommended other potential targeted components in the condition report section. In particular we recommend those components that can be easily installed and then removed for use in a future greenfield application. Robotics, ballistic screen, and optical sorters in that order are fairly easy to integrate into an existing system and are usually easy to plug and play into a new system at a later date. Long term, considering the dramatic change in material composition, age of the existing system, the County's progressive approach to recycling and the prospects for expanding the environmental programs offered to residents and businesses, the total redesign and replacement of the existing MRF system will yield greater environmental and financial benefits than retrofitting the existing system.

D. Recommendations for Operational Improvement

As with most MRFs, there is always opportunity to better grade incoming loads and avoid processing material over the system that would be better redirected to less costly processes. Expanding tip floor grading practices to better direct material to the best "process application" would be a huge time and cost savings while contributing to improved yield and quality. A second opportunity which happens to also be people centric, regards sorter retention and production awareness. We recommend that the team bring more "Lean Manufacturing" tools to the sorting platforms. Color coding sorting chutes and installing chute pictures would help increase product quality and give staff a better understanding of what each sort of station does. Workstation information boards might also be considered. Identify key drivers for each workstation and post. Example: priority picks, picks per minute expected, PPE required, sorting threats and any other workstation specific standard procedures. Workstations might include presort, cardboard QC, fiber sorting platform and container sorting platform. We also recommend that the Gemba board (production board) be placed in the plant on the fiber workstation platform. It should be reviewed with line leads and operators 3 times a day to assure production performance success.

E. Potential Improvements Projected with New System

There are several advanced technologies that are absolute requirements for future processing. As it relates to the WCMRF, the following technologies should be reviewed and employed.

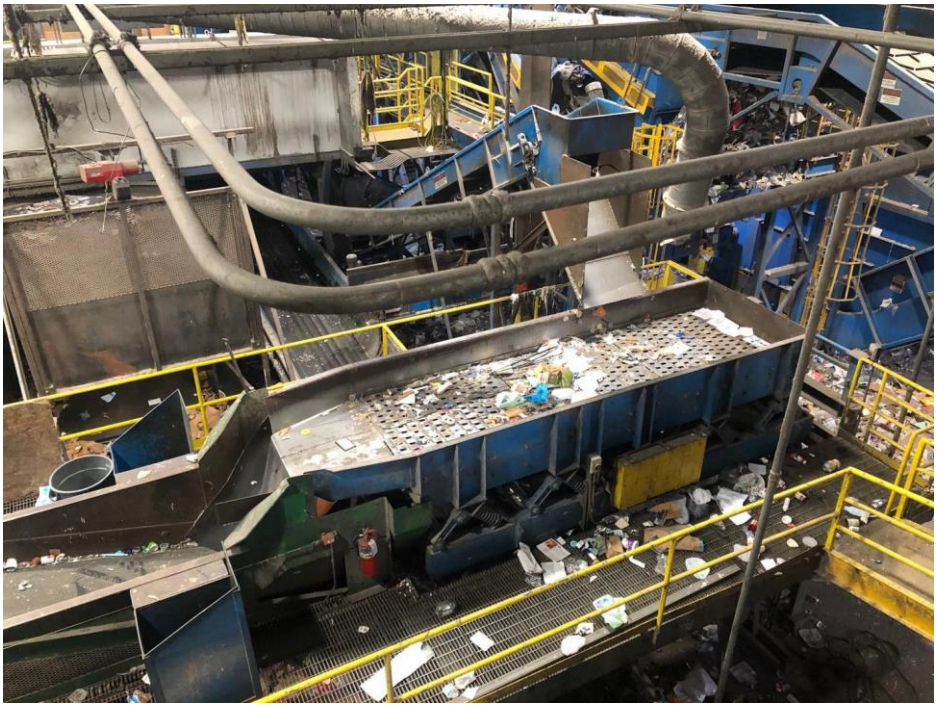
1. Plastic's optical sorting on #1, #2, and #5 plastic resins (increased yield and speed)
2. Robotic sorting on post aluminum residue reduction line (increased yield and speed)
3. Robotic QC sorting of aluminum (increased quality and speed)
4. Ballistic screens to replace vibratory screen and possibly newspaper screens (increased yield and quality)
5. Reduced wrap star screens to replace newspaper screens #1 and #2 (increased uptime, increased paper/container separation)
6. Enhanced Eddy Current (increased yield and quality)
7. Larger drum feeder (reduced surging and increased yield and speed)
8. Paper optical sorting on fiber line (reduced mixed paper, increased cardboard yield, reduced labor, increased quality)

In the opinion of SCS, the total replacement of the MRF system will:

1. Increase production run rates by 5-10 tons per hour
2. Increase plant capacity
3. Decrease labor cost per ton produced
4. Decrease maintenance cost per ton produced
5. Improve yield and quality.

EXHIBIT A: PHOTOS

A. Vibratory screen feeding the container line. We recommend replacing with a ballistic-type screen to better remove fiber for increased container yield down-stream.



B. Fiber Screen #1 (6” Scalping, 2” Fines, Newspaper Star Screen)

The yellow chain guards for the 3 different screens are shown below. We recommend you consider new shaft-wrapping reduction screens now available. They have extra large diameter shafts that resist plasticfilm and clothing wrapping.

C. Fiber Screen #3 (Finishing Screen)

We recommend you consider a possible upgrade to a ballistic-type screen. The ballistic screen is moreefficient at small fiber and container separation, and because it has no shafts and stars, it is much lessexpensive to operate.

D. Eddy-Current

This unit is small and will struggle with yield and quality at design speeds. We recommend the review ofa more powerful and wider unit. This is also the platform area that robotics application would be optimal.

E. Baler Chain Conveyor

We recommend that the lubrication processes be reviewed and that an auto-oiler system be considered.

F. Fiber Sorting Platform

This is an area where future optical sorting will help reduce mixed paper production and increase #56residential fiber pack. Labor reductions should decrease processing costs.

G. Container Sorting Line

This was designed originally as a two-sided, sort platform. It has been modified for a one-sided, toss- across sorting which is more efficient. This is another area where optical sorting could greatly enhanceoperations and reduce cost.

4. Exhibit B – Video

A video guide of the system flow with audible is a stand-alone attachment